

13th Edition

The Blue Book

OCULAR DISORDERS
PRESUMED TO BE INHERITED
IN PUREBRED DOGS

GENETICS COMMITTEE OF
THE AMERICAN COLLEGE
OF VETERINARY
OPHTHALMOLOGISTS

2021



Foreword

Ocular disorders, proven or presumed to be inherited in purebred dogs, have been a topic of intense dialogue by Diplomates of the American College of Veterinary Ophthalmologists (ACVO) for many years. Discussions commenced in the latter half of the 20th century during the early days of this College's inception, have continued into the 21st century, and will no doubt continue for years to come. Our knowledge of the existence, nature, progression, and inheritance of ocular disorders continues to expand as this field of veterinary science evolves. The Genetics Committee of the ACVO was originally formed in response to requests by registries, breed groups, and veterinarians, with the intent to provide a scientific advisory panel and guidelines regarding ocular disorders in purebred dogs. The Genetics Committee of today remains engaged in an ongoing effort to update information on ocular disorders for this purpose.

The content of this production has originated from several sources as the ACVO recently created a Companion Animal Eye Registry (CAER), which is a joint effort between the Orthopedic Foundation for Animals (OFA) and the ACVO. The addition of eye examination results to the OFA database makes the OFA the most complete source of canine health screening results in the world, allowing responsible breeders to make more informed breeding decisions in an effort to reduce the incidence of inherited disease.

The generation of statistical information is made possible by the efforts of dedicated breeders of purebred dogs who present their dogs to Diplomates of the ACVO for an OFA Companion Animal Eye Registry examination. The research copies of these examinations are then conscientiously submitted to OFA by the examining Veterinary Ophthalmologists. These data generate annual statistics. The statistics for each breed are then reviewed by the Genetics Committee for the most recent year and from the previous 5 years. Recommendations regarding the ocular disorders listed for each breed and the breeding advice are compiled following guidelines detailed elsewhere in this publication. A comprehensive review of the scientific literature since the last published edition was undertaken by all committee members. The scientific articles and breed disorders from the statistical and literature review have been added to the information on each breed in the production of this document. The collective educated clinical experience of the committee members is utilized to reach a consensus of opinion in areas where there remains a paucity of hard scientific proof regarding certain identified breed problems.

The current Genetics Committee has instituted an annual scientific literature search, in addition to the previously established yearly statistical data review. This information is compiled and submitted in an effort to maintain a bank of current information for future editions and versions of this document. The content of all editions past, present, and future will remain dynamic and ever changing as more precise technologies advance the study of the canine genome, as continued scientific research expands our knowledge, and as the database grows.

It is an honor and a privilege to serve the ACVO, our fellow Diplomates, reputable dog breeders, and our most trusted canine companions in this endeavor.

Genetics Committee 2021

Freya Mowat (Chair), Sony Kuhn Asif (Co-chair), Katelyn Fentiman (Past Chair), Emily McCool, Simone Iwabe, Ursula Dietrich, Sami Pederson, Melissa Kubai

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Simon Petersen-Jones – ECVO Advisor 2021

Katie Diehl – OFA Liaison 2021

13th Edition 2021 Version Acknowledgements

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The ACVO Board of Regents

Genetics Committee Chairs Dr. Andras Komaromy 2006-2008, Dr. Katie Diehl (2009-2011), Dr. Jacqueline Pearce (2011-2012), Dr. Carrie Breaux (2011-2013), Dr. Kenneth Pierce (2014), Dr. Wendy Townsend (2015), Ellen Belknap (2016), Jessica Meekins (2017), Renee Carter (2018), Adam King (2019), Jane Ashley Huey (2020), Freya Mowat (2021) and all previous Genetics Committee members

Eddie Dziuk, Chief Operating Officer, and Erika Werne, CAER Program Manager, for the OFA

Introduction

What is the purpose of this book?

The Orthopedic Foundation for Animals (OFA), Canine Eye Registration Foundation (CERF), other breed registry groups, breed clubs, and practicing veterinarians have requested that the American College of Veterinary Ophthalmologists (ACVO) provide a scientific advisory panel to furnish guidelines regarding ocular disorders of major concern to purebred dogs. The Genetics Committee of the ACVO was formed in response to these requests and is engaged in an ongoing effort to update information on ocular disorders proven or suspected to be hereditary in purebred dogs. The compendium of ocular disorders and breeding recommendations which follow are interim guidelines. They are reviewed regularly and revised whenever additional information becomes available.

How can this information be used?

National and international breed clubs are encouraged to submit their input regarding breeding decisions for ocular disorders found in their breeds. **Local breed clubs** can participate by encouraging and organizing ocular examination clinics and forwarding their requests and concerns to their national organization. **Practicing veterinarians** are encouraged to contribute by informing all owners of potential breeding animals of the value and availability of ocular examinations, prior to breeding. Information regarding ocular disorders found in litters or individuals can be forwarded to the Genetics Committee via any ACVO diplomate. **Individual breeders** wishing to uphold high ethical standards for the improvement of their breed are urged to contribute by annual examination of their breeding animals and by encouraging the same from other breeders. Further information can be obtained from the Orthopedic Foundation for Animals (OFA): 2300 E Nifong Boulevard, Columbia, MO, 65201-3806, 573-442-0418. Only through increased awareness of the problems and a sustained cooperative effort to disseminate accurate information, will we be able to control and/or eliminate hereditary eye diseases in purebred dogs.

How do we identify an inherited eye disease?

Although there are noteworthy exceptions, most of the ocular diseases of dogs which are presumed to be hereditary have not been adequately documented. Genetic studies require examination of large numbers of related animals in order to characterize the disorder (age of onset, characteristic appearance, rate of progression) and to define the mode of inheritance (recessive, dominant). In a clinical situation, related animals are frequently not available for examination once a disorder suspected to be inherited is identified in an individual dog. Maintaining a number of dogs for controlled breeding trials through several generations is a long and costly process. Both of these obstacles are compounded by the fact that many ocular conditions do not develop until later in life. Due to the potential for disease to arise from inherited genetic defects at any age, the Genetics Committee recommends annual eye exams.

Until the genetic basis of an ocular disorder is defined in a published report, we rely on what statistical information is available from registry organizations, informed opinions and consensus from ACVO diplomates, and must satisfy ourselves with terms like "presumed inherited" and "suspected to be inherited." Several companies provide information on genetic testing which greatly assists in providing more information and data to aid in defining the canine genetics of ocular diseases.

When do we suspect that a disorder is inherited in a given breed?

- When the frequency is greater than in other breeds
- When the frequency increases in a given breed as a whole
- When the frequency is greater in related dogs within a breed
- When it has a characteristic appearance and location
- When it has a characteristic age of onset and course of progression (predictable stages of development and time for each stage to develop)
- When it looks identical to an entity which has been proven to be inherited in another breed

Special thank you to the “Father of Veterinary Medical Genetics,” Donald F. Patterson, DVM, DSc. Dr. Patterson, who died in 2013, was Emeritus Professor of Medicine and Medical Genetics, University of Pennsylvania School of Veterinary Medicine and Emeritus Professor of Human Genetics, University of Pennsylvania School of Medicine. These guidelines on the heritability of disorders in dogs are based on his lectures and publications.

Guidelines Used by the ACVO Genetics Committee in Making Breeding Recommendations

In this book, we chose the term "**BREEDING ADVICE**" and intentionally avoided the words "certifiable" and "registerable." The ACVO does not serve as a registry organization. Registry organizations operate independently of the ACVO and set their own standards for registration. However, the OFA does follow the guidelines set forth by the ACVO Genetics Committee in this publication. Any registry organization may use the information in this compendium and results of examinations performed by ACVO Diplomates in the registering of animals with regard to breeding suitability as they see fit.

It is important to recognize that the sensitivity of genetic disorder detection is greater when large numbers of dogs are examined. The extensive number of disorders listed in this book for some breeds may reflect the popularity of the breed and the numbers of animals evaluated. Conversely, the lack of disorders listed for other breeds often reflects only the paucity of examinations reported for each breed. For these reasons, the ACVO Genetics Committee strongly recommends annual evaluations of dogs of all breeds as the imperative first step in the control of hereditary ocular disorders. We would like to acknowledge the contribution of the Orthopedic Foundation for Animals (OFA) and Canine Eye Registration Foundation (CERF) for providing statistical summaries of ophthalmic examinations from their files.

For each breed, specific ocular disorders have been listed which are known or suspected to be inherited based on one or more of the following criteria:

- 1) There are published reports in the scientific literature regarding a condition in a particular breed with evidence of inheritance.
- 2) The incidence of affected animals (from OFA and CERF reports) is greater than or equal to 1% of the examined population with a minimum of five affected animals per five year period. Regardless of the population of dogs examined, if 50 or more affected individuals are identified in a five year period, the entity will be listed for that breed.
- 3) A specific request from a breed club that a condition be included for their breed may be considered at the ACVO annual meeting of the Genetics Committee if information is received by August 1. Such requests are reviewed critically and must include specific documentation as to the disorder in question and the numbers seen. Further information from the breed club may be requested. The request must receive agreement by a majority of the committee.
- 4) There is overwhelming opinion by a majority of the Genetics Committee members that clinical experience by ACVO Diplomates would indicate a particular condition should be listed for a breed, in spite of the absence of direct evidence of affected animals on OFA or CERF reports.
- 5) Results of genetic laboratory research and genetic testing.

The "Breeding Advice" given is determined by the significance of the condition to vision and/or very strong evidence of heritability:

Two categories of advice regarding breeding have been established:

NO: Substantial evidence exists to support the heritability of this entity AND/OR the entity represents a potential compromise of vision or other ocular function.

BREEDER OPTION: Entity is suspected to be inherited but does not represent potential compromise of vision or other ocular function.

When the breeding advice is "**NO**," even a minor clinical form of the entity would make this animal unsuitable for breeding. When the advice is "**BREEDER OPTION**," caution is advised. In time, it may be appropriate to modify this stand to "**NO**" based on accumulated evidence. If, in time, it becomes apparent that there is insufficient evidence that an entity is inherited, it may be deleted from the list.

There are currently eleven disorders for which there is an unequivocal recommendation against breeding in all breeds:

These are conditions which frequently result in blindness and for which there is definite evidence of heritability in one or more breeds. However, these disorders will not be listed on the individual breed page for a given breed, unless they also meet the criteria described above.

- **Keratoconjunctivitis sicca (KCS)** – Breeding is not recommended for any animal demonstrating keratitis consistent with KCS. The prudent approach is to assume KCS to be hereditary except in cases suspected to be non-genetic in origin. See *note.
- **Glaucoma** – See *note.
- **Persistent Pupillary Membranes**
 - **Iris to Lens**
 - **Iris to Cornea**
 - **Iris Sheets**
 - **Endothelial Opacity/No Strands**
- **Cataract** – Breeding is not recommended for any animal demonstrating partial or complete opacity of the lens or its capsule *unless the examiner has also checked the box for "suspect not inherited" or unless specified otherwise for the particular breed.* See *note.
- **Lens luxation or subluxation** – See *note.
- **Persistent hyperplastic primary vitreous (PHPV)/persistent hyperplastic tunica vasculosa lentis (PHTVL)** – See *note.
- **Retinal detachment** – See *note.
- **Retinal atrophy – generalized (PRA)** - Breeding is not advised for any animal demonstrating bilaterally symmetric retinal degeneration (considered to be PRA unless proven otherwise).
- **Retinal dysplasia, geographic or detached forms** – See *note.
- **Optic nerve coloboma**
- **Optic nerve hypoplasia**

*Note: The prudent approach of these disorders is to assume they are hereditary except in cases specifically known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

In breeds recognized with Persistent Pupillary Membrane (PPM) as an inherited problem there is an unequivocal recommendation against breeding when there is PPM iris to lens, or PPM iris to cornea, or iris sheets. Breeding advice is "**NO**."

The following breeds are recommended to have a preliminary examination prior to initial pharmacological dilation to best facilitate identification of these disorders:

Dalmatian – iris hypoplasia/sphincter dysplasia

Australian Shepherd – iris coloboma

Miniature American Shepherd/Miniature Australian Shepherd – iris coloboma

Toy Australian Shepherd – iris coloboma

Any Breed with Merle Phenotype – iris hypoplasia/iris coloboma

What can be detected during an Eye Certification Examination?

A routine eye screening examination includes indirect ophthalmoscopy and slit lamp biomicroscopy following pharmacological dilation of the pupils. Gonioscopy, tonometry, Schirmer tear test, electroretinography, and ultrasonography are not routinely performed; thus, dogs with goniodysgenesis, glaucoma, keratoconjunctivitis sicca, or some early cases of progressive retinal atrophy might not be detected without further testing.

The diagnoses obtained during an ophthalmic eye certification examination refer only to the **phenotype** (clinical appearance) of an animal. Thus, it is possible for a clinically normal animal to be a carrier (abnormal **genotype**) of genetic abnormalities.

An individual ACVO Diplomate may disagree with the breeding advice contained in this compendium. It is appropriate for this examiner to contact the ACVO Genetics Committee to voice disagreement, initiate change, or suggest additions. The members of the Genetics Committee represent the ACVO but acknowledge that the information generated for a breed may not agree with the knowledge and clinical experience of every individual ACVO Diplomate.

What is the role of the responsible dog breeder?

The final beneficiary of the information in this book is the dog breeder. It is up to the conscientious breeder to use this information along with other criteria in selecting which animals to breed. To assist this determination, current certification is recommended. Animals currently free of heritable eye disease will be issued a certificate on receipt of the examination/application by OFA. To avoid confusion between a normal animal (no evidence of heritable eye disorders) and one that may have a minor fault coming under the advice of Breeder Option, the Breeder Option category will be printed on the certificate. This is intended to stimulate conversation as to the specific nature of the Breeder Option condition found in that particular animal, allowing breeders using a dog in a breeding program to make an informed decision.

There are many ocular conditions which are a direct result of selection for a facial conformation considered desirable by breeders.

These include:

- Entropion
- Ectropion
- Macrophthalmos
- Exposure keratopathy syndrome

Facial conformation with excessively prominent eyes, heavy facial folds, or eyelids which are either inverted or everted predispose animals to corneal irritation, discomfort, and if left untreated, can lead to loss of vision. A responsible breeding program should recognize and select away from these exaggerated facial

features.

THE ROLE OF GENETIC TESTING IN THE DETECTION OF OCULAR DISEASE

Genetic testing plays a very important role in the diagnosis of disease. However, it is important to be aware of the limitations of genetic testing and understand its role in the detection and control of genetically inherited diseases.

Genetically inherited diseases are caused by a deleterious sequence change (mutation) in the DNA that results in an abnormal protein (protein can be absent, have insufficient function, or have an abnormal function) that results in disease.

Genetic tests are developed by comparing the DNA sequence of a normal animal to that of an animal with disease. This allows the identification of a particular DNA sequence that can be causally associated with the disease. This is an extremely powerful tool that, in some cases, allows for identification of disease even before it is evident clinically.

However, a particular test is only capable of detecting the DNA sequence it was designed to detect. That is, the DNA test only tests for a specific change in the DNA that can cause disease. For example, a DNA test specific for the *PDE6B* gene mutation (responsible for the rcd1 form of PRA in the Irish Setter) will not detect any abnormalities in other breeds or mixed breeds that have other mutations in the same gene. Thus the specificity of a DNA test is also its limitation, and in the case of PRA in Irish Setters it is specific for the Irish Setter defect and not for any other defects.

In polygenic disorders, a genetic test cannot evaluate the integrity of all the proteins that make up a particular cellular process. Thus, it is possible for a DNA test that has been associated with a disease to be normal and yet the disease can still be present. The disease could be caused by an abnormality in one of the other genes that are involved with that particular cellular process. The defect in the other protein still results in an abnormal cellular process, which still results in disease. A perfect example of this is observed in oculo-skeletal dysplasia in Labrador Retrievers and Samoyed dogs. In both breeds the diseases are clinically identical, yet caused by mutations in different genes involved in fibril formation of a specific kind of collagen molecule.

Thus, obtaining a DNA test that is normal does not guarantee absence of disease. It only guarantees that the particular change the DNA test was designed to detect is not present, and that disease from that particular change will not occur. This is why genetic testing should be combined with ophthalmic examination for maximum efficacy. An ophthalmic exam evaluates the sum total or "result" of all the cellular processes required to maintain ocular health and result in vision, and is an essential part of the ocular wellness exam to ensure that other important clinically recognizable diseases are not present.

Breeder Option Codes

A – Eyelids

- A1 Entropion
- A2 Ectropion
- A3 Distichiasis
- A4 Ectopic Cilia
- A6 Imperforate Lacrimal Punctum

B – Nictitans

- B1 Cartilage Anomaly/Eversion
- B2 Gland Prolapse

C – Cornea

- C1 Corneal Dystrophy – Epithelial/Stromal
- C2 Corneal Dystrophy – Endothelial
- C4 Pigmentary Keratitis/Keratopathy

D – Uvea

- D1a Uveal Cyst – Free Floating
- D1b Uveal Cyst – Single
- D1c Uveal Cyst – Multiple
- D2 Iris Coloboma
- D3 Persistent Pupillary Membranes – Iris to Iris
- D4 Iris Hypoplasia

E – Lens

- E1 Cataract – Suspect Not Inherited
- E2 Posterior Y Tip Suture Opacities

F – Vitreous

- F1 Persistent Hyaloid Artery
- F2a Vitreous Degeneration – Syneresis
- F2b Vitreous Degeneration – Anterior Chamber

G – Fundus

- G1 Retinal Dysplasia – Folds
- G5 Micropapilla
- G6a CMR-Type Retinopathy
- G6b Retinopathy

Glossary of Terms

(For more detailed definitions, the reader is referred to medical and genetic scientific texts.)

Achromatopsia: see **Day blindness**

Canine multifocal retinopathy: characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). The condition includes numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina with accumulation of material that produces gray-tan-pink colored lesions (multifocal bullous retinal detachments). These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs and might not progress or progress slowly, or may appear to heal with discrete areas of tapetal hyper-reflectivity or hyperpigmentation. Most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas.

Cataract: any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

Ceroid lipofuscinosis: an inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease.)

Choroidal hypoplasia: a congenital, inherited, non-progressive defect primarily affecting the choroid resulting in some or all of the following: decreased or lack of pigment in the retinal pigment epithelium or choroid, tapetal thinning, and reduced or abnormal choroidal blood vessels.

Chronic superficial keratitis (CSK): see **Pannus**

Collie eye anomaly: a congenital syndrome of ocular anomalies characterized by bilateral and often symmetrical defects including any combination of **choroidal hypoplasia**, **coloboma**, and **retinal detachment(s)**.

Coloboma: a congenital abnormality in ocular development usually characterized by focal absence of tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure.

Cone degeneration: the loss of photopic vision caused by selective degeneration of the cone photoreceptors. Also known as day blindness, hemeralopia, or achromatopsia.

Corneal degeneration: opacification of one or more of the corneal layers frequently resulting from deposition of lipid or mineral and occurring secondary to chronic inflammation.

Corneal dystrophy: non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers (**epithelium**, **stroma**, **endothelium**). The term dystrophy implies an inherited condition. It is usually bilateral although not necessarily symmetrical and the onset in one eye may precede the other.

Corneal dystrophy - endothelial: breed-related loss or dysfunction of corneal endothelial cells resulting in bilateral, progressive corneal edema.

Corneal dystrophy - epithelial, stromal: breed-related, non-inflammatory, white to silver-colored opacification of the corneal epithelium and/or stroma frequently resulting from deposition of lipid.

Day blindness: see **Cone degeneration**

Dermoid: a congenital, non-cancerous growth occurring on the cornea, conjunctiva, or eyelid typified by the presence of skin-like structures.

Distichiasis: the presence of abnormally oriented eyelashes, frequently protruding from Meibomian gland ductal openings.

Dry eye: see **Keratoconjunctivitis sicca**

Dysplasia: abnormality of development.

Dystrophy: non-inflammatory, developmental, nutritional, or metabolic abnormality; dystrophy implies a possible hereditary basis and is usually bilateral.

Ectopic cilia: aberrant hairs emerging through the palpebral conjunctiva which often causes ocular discomfort and corneal disease.

Ectropion: a conformational defect resulting in eversion of the eyelid margin, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Entropion: a conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Euryblepharon: an exceptionally long eyelid marginal length, which may lead to Ectropion or Entropion. Euryblepharon is synonymous with the term macropalpebral fissure.

Exposure/pigmentary keratitis: a condition characterized by variable degrees of superficial vascularization, fibrosis, and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos, and macropalpebral fissure.

Glaucoma: characterized by an elevation of intraocular pressure (IOP) which causes optic nerve and retinal degeneration and results in blindness. Diagnosis and classification of glaucoma requires tonometry and gonioscopy, which are not part of a routine eye certification examination.

Glaucoma, pigmentary: see **Ocular melanosis**

Goniodysgenesis: congenital anomaly characterized by the persistence of a variably fenestrated sheet of uveal tissue spanning the iridocorneal angle, extending from the iris base to the peripheral cornea. Diagnosis is by gonioscopy, which is not part of a routine eye certification examination.

Hemeralopia: see **Cone degeneration**

Imperforate lacrimal punctum: developmental anomaly resulting in an imperforate opening of the lacrimal puncta. An imperforate lower punctum may result in epiphora, an overflow of tears onto the face.

Iridocorneal angle: the junction between the iris and the cornea; the drainage angle. Aqueous humor leaves the anterior chamber via the trabecular meshwork within the iridocorneal angle into the venous circulation.

Iris coloboma: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the eye certification form.

Iris cyst: see **Uveal cyst**

Iris hypoplasia: a congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the eye certification form.

Iris melanoma: see **Uveal melanoma**

Iris sphincter dysplasia: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality has been noted in the Dalmatian breed.

Keratitis: inflammation of the cornea.

Keratitis, punctate: inflammation of the cornea accompanied by multifocal, coalescing areas of stromal corneal ulceration of variable depth.

Keratoconjunctivitis sicca (KCS): an abnormality of the tear film attributed to deficiency of the aqueous portion of the tears. Progressive KCS may result in ocular surface irritation and/or vision impairment via corneal opacification. Also called dry eye. The test for this condition is the Schirmer Tear Test, which is not part of a routine eye certification examination.

Lens subluxation/luxation: partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment.

Lenticonus: an anomaly of the lens in which the anterior or posterior surface protrudes in a conical form; usually congenital.

Macroblepharon: an exceptionally large palpebral fissure. Macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

Merle: an incompletely dominant phenotype in which heterozygous (M/m) dogs exhibit a coat color phenotype of various dilute color patches, while homozygous (M/M) dogs exhibit marked hypopigmentation and ocular defects, including microphthalmia, blindness and colobomas, and deafness. Deafness and ocular defects are sometimes seen in heterozygous individuals.

Micropapilla: a congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

Microphakia: a congenital anomaly in which there is an abnormally small lens.

Microphthalmos: a congenital anomaly in which the globe is abnormally small. Commonly associated with multiple ocular malformations and when severe, may affect vision.

Nictitans cartilage anomaly/eversion: a congenital anomaly in the nictitating membrane in which the T-shaped cartilage is malformed and/or folded.

Nictitans gland prolapse: protrusion of the tear-producing gland of the nictitating membrane from its normal position posterior to the nictitating membrane, to a position superior to the free margin of this structure.

Nodular granulomatous episclerokeratitis (NGE): an inflammatory disorder of the sclera and episclera, with occasional corneal involvement, characterized by granulomatous infiltrates. Previously known as **Proliferative keratoconjunctivitis**. This condition is most commonly seen in the Collie.

Nyctalopia: loss of scotopic (night) vision. Causes include genetic defects in photoreceptors and in retinal pigment epithelium, either dystrophy or degeneration of affected cells.

Ocular melanosis: progressive bilateral and sometimes asymmetrical increase in pigmentation with melanocytic accumulation the uveal tract and adjacent tissues. Ultimately progresses to glaucoma and loss of vision in most cases (melanocytic glaucoma). Not associated with systemic disease or metastases. Most often recognized in Cairn Terriers.

Optic nerve coloboma: a congenital abnormality of the optic nerve commonly associated with failure of closure of the optic fissure, resulting in a defect in the optic nerve in the anterior-posterior plane. May result in partial or total vision loss.

Optic nerve hypoplasia: a congenital anomaly, which results in a small optic disk diameter and vision loss. Contrast with micropapilla, which may have a similar ophthalmoscopic appearance but without loss of vision.

Pannus: a bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the inferior or inferiortemporal cornea, followed by the formation of a vascularized subepithelial opacity that begins to spread toward the central cornea; pigmentation may follow the vascularization. If severe, vision impairment occurs. Plasma cell infiltration of the nictitans may occur in conjunction with CSK, or on its own. (Also called "CSK".)

Persistent hyaloid artery (PHA): congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

Persistent hyperplastic primary vitreous (PHPV): congenital defect resulting from abnormalities in the regression of the hyaloid artery (the primary vitreous) and the interaction of the blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with congenital cataracts and frequently seen with PHTVL.

Persistent hyperplastic tunica vasculosa lentis (PHTVL): congenital defect resulting from failure of regression of the embryonic vascular network which surrounds the developing lens. Often associated with PHPV and a patent hyaloid artery.

Persistent pupillary membranes (PPM): persistent blood vessel remnants in the anterior chamber which fail to regress normally by 3 months of age. These strands arise from the iris collaret and may bridge from iris to iris, iris to lens, iris to cornea, or form sheets of tissue in the anterior chamber.

Persistent tunica vasculosa lentis (PTVL): clinically insignificant posterior epicapsular lenticular opacities resulting from incomplete regression of the embryonic vascular network which surrounds the developing lens.

Pigmentary glaucoma: see **Ocular melanosis**

Pigmentary uveitis: see **Uveitis, pigmentary**

Pigmentary keratopathy: a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated with congenital uveal pathology – iris hypoplasia and the presence of persistent pupillary membranes – but not with other factors such as Schirmer tear test values or medial canthal entropion.

Plasmoma: see **Pannus**. Also called Atypical Pannus. Bilateral thickening and depigmentation of the nictitans due to invasion of lymphocytes and plasma cells. It may or may not be associated with corneal involvement (Pannus).

Progressive rod-cone degeneration (PRCD) (see also **PRA**): Typically refers to recessively inherited generalized loss of rod photoreceptors followed by cone degeneration. Many different genetic mutations result in a similar phenotypic presentation.

Progressive retinal atrophy (PRA): an umbrella term used to describe a group of inherited dysplastic, dystrophic, or degenerative diseases of the retinal visual cells (photoreceptors, retinal pigment epithelium, or both).

Proliferative keratoconjunctivitis: see **Nodular granulomatous episclerokeratitis**

Retinal atrophy: a non-specific term used to describe a decrease in the number and deterioration of the cells of the retina, regardless of cause.

Retinal degeneration: see **Retinal atrophy**

Retinal detachment: a separation of the neurosensory retina from the retinal pigment epithelium.

Retinal dysplasia: abnormal development of the retina present at birth. This condition is non-progressive and recognized in 3 forms: **folds**, **geographic**, **detached**.

Retinal dysplasia – folds: seen ophthalmoscopically as linear, triangular, curved or curvilinear foci of retinal folding. May be single or multiple. In puppies, retinal folds can be seen as a transient phenomenon, resolving as the eye attains maturity.

Retinal dysplasia – geographic: an irregularly shaped area of retinal development containing both areas of thinning and areas of elevation. This form may be associated with visual impairment.

Retinal dysplasia – detached: severe retinal disorganization associated with separation of the neurosensory retina from the retinal pigmented epithelium. This form results in visual impairment.

Retinopathy: any non-inflammatory condition of the retina. These conditions can usually be detected by ophthalmoscopic examination, but an electroretinogram (ERG) may be required in some instances (e.g. canine multifocal retinopathy).

Rod-cone dysplasia: an inherited retinal disease characterized by abortive or abnormal development of rods and cones. Affected animals become blind early in life, usually within the first 6 months, with the exception of *rcd4* in the Gordon and Irish Setter dogs. See specific breed pages for rod-cone dysplasia type descriptions.

Rod dysplasia: abnormal development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years.

Uveal cyst: a pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions in various breeds.

Uveal cyst, anterior chamber: a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris or ciliary body epithelium which has detached from its site of origin and is free-floating in the anterior chamber.

Uveal cyst, ciliary body: a pigmented, fluid-filled, epithelial-lined structure arising from the ciliary body epithelium and attached to the ciliary body.

Uveal cyst, iris: a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris epithelium and attached to the iris.

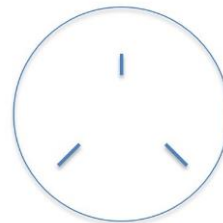
Uveal melanoma: a locally invasive melanocytic neoplasm arising within the uveal tract, may be benign (melanocytoma) or malignant (malignant melanoma). Uveal melanomas are reported in higher frequency in German Shepherd Dogs and Labrador Retrievers. Inherited iris melanoma has been reported in Labrador Retrievers.

Uveitis, pigmentary: a specific form of uveitis most commonly seen in middle-aged to older Golden Retrievers. Clinically manifests early as pigment deposition in a radial fashion on the anterior lens capsule with iridociliary cysts. Later stages are associated with posterior synechia, fibrinous anterior uveitis, cataract, and ultimately glaucoma. Not associated with systemic disease; may be asymmetric in presentation.

Uveodermatologic syndrome: an immune-mediated syndrome of anterior uveitis, chorioretinitis, dermal depigmentation (vitiligo), and hair depigmentation (poliosis). A similar syndrome in humans, called Vogt-Koyanagi-Harada syndrome (VKH), is an autoimmune disease directed against melanocytes. Secondary glaucoma and/or retinal detachment are frequent complications of this disease. Seen most commonly in the Akita, Samoyed, and Siberian Husky breeds.

Vitreous degeneration: Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

Y-suture tip opacity: These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



AFFENPINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT AFFENPINSCHER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 385		2017-2021 146		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.3%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.3%	2	1.4%	0	
25.110 DISTICHIASIS			21	5.5%	5	3.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	1	0.7%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.3%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	2	1.4%	0	
70.700 CORNEAL DYSTROPHY			6	1.6%	6	4.1%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			27	7.0%	19	13.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.3%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.3%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			4	1.0%	2	1.4%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	0.8%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			8	2.1%	1	0.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.3%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.3%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.3%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	0.3%	1	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			3	0.8%	1	0.7%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.7%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.3%	1	0.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	0.8%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			15	3.9%	5	3.4%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	0.8%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.5%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			2	0.5%	0	0.0%	0	
OPTIC NERVE								
130.120 OPTIC NERVE HYPOPLASIA			1	0.3%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	0.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			8	2.1%	1	0.7%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.3%	3	2.1%	0	
NORMAL								
.000 NORMAL GLOBE			324	84.2%	110	75.3%	0	

AFGHAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Corneal dystrophy - epithelial/stromal	Not defined	1, 2	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1, 3-6	NO
E.	Y-suture tip opacity	Not defined	1	Breeder Option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

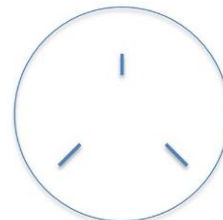
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The characteristic cataract in the Afghan Hound begins as equatorial lens vacuoles in dogs from 4 months to 2 years of age. The opacities then extend into the anterior and posterior cortices. Rapid progression can occur with visual impairment in young adults. Test breedings have been done which support a hereditary basis; however, the exact mode of inheritance is unknown.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Vainisi SJ, Goldberg MF. *Animal models of inherited disease. In: Genetic and Metabolic Eye Disease* Little Brown and Company, Boston, 1974.
3. Roberts SR, Helper LC. Cataracts in Afghan hounds. *J Am Vet Med Assoc.* 1972; 160: 427. PMID: 5014602
4. Roberts SR. Hereditary cataracts. *Vet Clin North Am.* 1973; 3: 433. PMID: 4801921
5. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract.* 1985; 26: 305.
6. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract.* 1978; 19: 109-120. PMID: 642468

OCULAR DISORDERS REPORT AFGHAN HOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,247		2017-2021 404		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
10.000 GLAUCOMA			2	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			2	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			26	1.2%	4	1.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			3	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			239	10.6%	55	13.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			4	0.2%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			63	2.8%	11	2.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.0%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			0	0.0%	1	0.2%	0	
FUNDUS								
97.120 COLOBOMA			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			130	5.8%	31	7.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			4	0.2%	10	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.1%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			29	1.3%	22	5.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	0.2%	5	1.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			8	0.4%	1	0.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			4	0.2%	3	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			3	0.1%	1	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.1%	1	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			13	0.6%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.1%	1	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.1%	1	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.1%	1	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.1%	1	0.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	1	0.2%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.1%	2	0.5%	0	

OCULAR DISORDERS REPORT AFGHAN HOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,247		404		0	
	#	%	#	%	#	%	#	%
LENS Continued								
100.328 Y-SUTURE TIP OPACITIES	20	0.9%	32	7.9%	0		0	
100.330 GENERALIZED/ COMPLETE CATARACT	2	0.1%	0	0.0%	0		0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	121	5.4%	84	20.8%	0		0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.0%	1	0.2%	0		0	
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0		0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.3%	1	0.2%	0		0	
110.320 VITREOUS DEGENERATION SYNERESIS	7	0.3%	1	0.2%	0		0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS	6	0.3%	0	0.0%	0		0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0		0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	0.4%	0	0.0%	0		0	
120.960 RETINOPATHY	3	0.1%	0	0.0%	0		0	
OPTIC NERVE								
130.110 MICROPAPILLA	0	0.0%	3	0.7%	0		0	
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0		0	
OTHER								
900.000 OTHER, UNSPECIFIED	20	0.9%	0	0.0%	0		0	
900.100 OTHER, NOT INHERITED	34	1.5%	1	0.2%	0		0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	1.0%	18	4.5%	0		0	
NORMAL								
.000 NORMAL GLOBE	1,779	79.2%	268	66.3%	0		0	

AIREDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT AIREDALE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 788		2017-2021 164		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			3	0.4%	0	0.0%	0	
10.000 GLAUCOMA			0	0.0%	1	0.6%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.3%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			4	0.5%	0	0.0%	0	
25.110 DISTICHIASIS			54	6.9%	14	8.5%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			9	1.1%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.4%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			25	3.2%	7	4.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.9%	1	0.6%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			21	2.7%	1	0.6%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.3%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			4	0.5%	7	4.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.4%	7	4.3%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.6%	0	
FUNDUS								
97.120 COLOBOMA			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			7	0.9%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			51	6.5%	10	6.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	1.0%	7	4.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			6	0.8%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.3%	1	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			5	0.6%	4	2.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	0.5%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.4%	1	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			9	1.1%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	1.1%	1	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			6	0.8%	1	0.6%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			5	0.6%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.4%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.6%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.6%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	1	0.6%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			4	0.5%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			0	0.0%	1	0.6%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			75	9.5%	18	11.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.4%	2	1.2%	0	
110.135 PHPV/ PTVL			1	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			7	0.9%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			21	2.7%	2	1.2%	0	

OCULAR DISORDERS REPORT AIREDALE TERRIER

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	788		164		0	
			#	%	#	%	#	%
RETINA Continued								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		9	1.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		12	1.5%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		0	0.0%	1	0.6%	0	
130.120	OPTIC NERVE HYPOPLASIA		0	0.0%	1	0.6%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		8	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		35	4.4%	1	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		12	1.5%	16	9.8%	0	
NORMAL								
.000	NORMAL GLOBE		580	73.6%	106	64.6%	0	

AKBASH DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AKBASH DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AKBASH DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 39		2017-2021 0		2021 0	
			#	%	#	%	#	%
GLOBE .110 MICROPHthalmia			1	2.6%	0		0	
EYELIDS 21.000 ENTROPION, UNSPECIFIED			3	7.7%	0		0	
22.000 ECTROPION, UNSPECIFIED			1	2.6%	0		0	
UVEA 93.120 IRIS CYST			2	5.1%	0		0	
LENS 100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	5.1%	0		0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	2.6%	0		0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	2.6%	0		0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	2.6%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			3	7.7%	0		0	
VITREOUS 110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	2.6%	0		0	
NORMAL .000 NORMAL GLOBE			32	82.1%	0		0	

AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1, 2	NO
B.	Entropion	Not defined	1, 3	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
E.	Cataract	Not defined	1	NO
F.	Y-suture tip opacity	Not defined	1	Breeder option
G.	Retinal dysplasia - folds	Not defined	1	Breeder option
H.	Uveodermatologic syndrome	Not defined	1, 4-14	NO

Description and Comments

A. Microphthalmia with multiple ocular defects

Multiple ocular defects consisting of small eye (microphthalmia), opacity of the lens (cataract), conical shape of the posterior lens (posterior lenticonus), and folding of the retina into rosettes (retinal dysplasia) have been reported in related Akita pups. Cataracts affected primarily the nuclear and cortical lens. Retinal dysplasia affected the superior retina overlying the tapetal fundus. Affected dogs may have severe visual dysfunction. An autosomal recessive mode of inheritance is suspected but not proven.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. OFA data indicates that entropion in the Akita usually occurs by 2 years of age.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Akita, many of these strands bridge between the iris and lens, thus resulting in focal cataract and possible vision impairment.

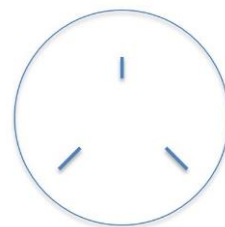
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require

further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

H. Uveodermatologic syndrome

Uveodermatologic syndrome in the Akita bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Akitas compared with other dog breeds. Affected dogs are generally young, ranging in age between 1 ½ to 4 years.

References

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OCULAR DISORDERS REPORT AKITA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 10,931		2017-2021 828		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			34	0.3%	6	0.7%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			105	1.0%	11	1.3%	0	
22.000 ECTROPION, UNSPECIFIED			15	0.1%	1	0.1%	0	
25.110 DISTICHIASIS			70	0.6%	9	1.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			6	0.1%	4	0.5%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			7	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			54	0.5%	13	1.6%	0	
UVEA								
93.120 IRIS CYST			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			272	2.5%	26	3.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			37	0.3%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			24	0.2%	4	0.5%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			3	0.0%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			10	0.1%	9	1.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.0%	2	0.2%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			28	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			248	2.3%	15	1.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			9	0.1%	2	0.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			8	0.1%	1	0.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.0%	1	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			48	0.4%	11	1.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.0%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			13	0.1%	8	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			10	0.1%	2	0.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			39	0.4%	1	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			10	0.1%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			18	0.2%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			7	0.1%	2	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			11	0.1%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	2	0.2%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			12	0.1%	9	1.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			26	0.2%	2	0.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			252	2.3%	46	5.6%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			17	0.2%	3	0.4%	0	

OCULAR DISORDERS REPORT AKITA

Year Examined: Total # Dogs:		1991-2016 10,931		2017-2021 828		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	5	0.0%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	8	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	205	1.9%	14	1.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	22	0.2%	4	0.5%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	90	0.8%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	6	0.1%	0	0.0%	0	
120.960	RETINOPATHY	0	0.0%	1	0.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	8	0.1%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	52	0.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	177	1.6%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	97	0.9%	28	3.4%	0	
NORMAL							
.000	NORMAL GLOBE	9,750	89.2%	668	80.7%	0	

ALANO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALANO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ALANO

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

ALAPAHO BLUE-BLOOD BULLDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALAPAHO BLUE-BLOOD BULLDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ALAPAHA BLUE-BLOOD BULLDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0		1	50.0%	0	
NORMAL .000 NORMAL GLOBE		0		1	50.0%	0	

ALASKAN KLEE KAI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	2	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT ALASKAN KLEE KAI

Year Examined: Total # Dogs:		1991-2016 662		2017-2021 240		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	48	7.3%	11	4.6%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.3%	2	0.8%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.2%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	11	1.7%	2	0.8%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.3%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	1.1%	4	1.7%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.2%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.8%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	1.8%	11	4.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	0.5%	6	2.5%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.2%	1	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.3%	3	1.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	7	1.1%	3	1.3%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	15	2.3%	15	6.3%	0	
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	8	1.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	0.8%	1	0.4%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	6	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	4	0.6%	1	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.4%	6	2.5%	0	
NORMAL							
.000	NORMAL GLOBE	579	87.5%	203	84.6%	0	

ALASKAN MALAMUTE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy: epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Cone degeneration - day blindness	Autosomal recessive	1, 2-8	NO	Mutation in the <i>CNGB3</i> gene

Descriptions and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a deletion in the *CNGB3* gene. A DNA test is available.

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OCULAR DISORDERS REPORT ALASKAN MALAMUTE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 8,982		2017-2021 1,005		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.0%	0	0.0%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			5	0.1%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			200	2.2%	16	1.6%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			75	0.8%	15	1.5%	0	
UVEA								
93.120 IRIS CYST			6	0.1%	2	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			3	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			576	6.4%	80	8.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			39	0.4%	3	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			12	0.1%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			4	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			9	0.1%	9	0.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			2	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.0%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			125	1.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			360	4.0%	48	4.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			28	0.3%	14	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			144	1.6%	12	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			23	0.3%	5	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			20	0.2%	3	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			72	0.8%	7	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			18	0.2%	7	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			41	0.5%	14	1.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			29	0.3%	6	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			363	4.0%	35	3.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			41	0.5%	5	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			80	0.9%	6	0.6%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			22	0.2%	2	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			46	0.5%	8	0.8%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.0%	2	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			18	0.2%	11	1.1%	0	

OCULAR DISORDERS REPORT ALASKAN MALAMUTE

Year Examined: Total # Dogs:		1991-2016 8,982		2017-2021 1,005		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	3	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	3	0.0%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	4	0.4%	0	
100.328	Y-SUTURE TIP OPACITIES	10	0.1%	4	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	81	0.9%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,182	13.2%	146	14.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	10	0.1%	3	0.3%	0	
110.135	PHPV/ PTVL	6	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	12	0.1%	1	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	60	0.7%	1	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	19	0.2%	2	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	17	0.2%	1	0.1%	0	
120.400	RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	
120.960	RETINOPATHY	1	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	9	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	2	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	75	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	257	2.9%	3	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	119	1.3%	41	4.1%	0	
NORMAL							
.000	NORMAL GLOBE	7,061	78.6%	731	72.7%	0	

ALASKAN NOBLE COMPANION DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALASKAN NOBLE COMPANION DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ALASKAN NOBLE COMPANION DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		57		33		0	
			#	%	#	%	#	%
UVEA								
93.170	ANTERIOR CHAMBER CYST		0	0.0%	1	3.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		4	7.0%	1	3.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	3.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		0	0.0%	1	3.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	1	3.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		1	1.8%	0	0.0%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	3.0%	0	
NORMAL								
.000	NORMAL GLOBE		54	94.7%	30	90.9%	0	

AMERICAN ALSATIAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ALSATIAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN ALSATIAN

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1		2		0	
			#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	2	100.0%	0	

AMERICAN BANDOGE MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN BANDOGE MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN BANDOGGE MASTIFF

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

AMERICAN BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	3	Breeder Option	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

American Bulldogs with glaucoma were reported to have uveal cysts (evident on ophthalmic exam, ultrasound biomicroscopy and/or histopathology), goniodysgenesis, and anterior segment inflammation. Consistent clinical findings among reported individuals included an absent menace response, diminished to absent light perception, mydriasis, and elevated intraocular pressures.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is

minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. A DNA test is available.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Pumphrey SA, Pizzirani S, Pirie CG, et al. Glaucoma associated with uveal cysts and goniodysgenesis in American Bulldogs: a case series. *Vet Ophthalmol*. 2012;1-9. PMID: 23110479
3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007 May;48:1959-1967. PMID: 17460247

OCULAR DISORDERS REPORT AMERICAN BULLDOG

Year Examined: Total # Dogs:		1991-2016 135		2017-2021 15		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	3	2.2%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	9	6.7%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED	2	1.5%	0	0.0%	0	
25.110	DISTICHIASIS	31	23.0%	1	6.7%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	4	3.0%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.7%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	1	0.7%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	6.7%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	3.0%	1	6.7%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	6.7%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.7%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	1.5%	1	6.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.7%	1	6.7%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1	0.7%	1	6.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	2.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	16	11.9%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.7%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	94	69.6%	12	80.0%	0	

AMERICAN BULLY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN BULLY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN BULLY

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	5	3.4%	0	
CORNEA							
70.700 CORNEAL DYSTROPHY		0	0.0%	1	0.7%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	7	4.8%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		0	0.0%	2	1.4%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	5	3.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX		0	0.0%	2	1.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	4	2.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS		0	0.0%	1	0.7%	0	
100.328 Y-SUTURE TIP OPACITIES		0	0.0%	1	0.7%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	8	5.5%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		0	0.0%	3	2.1%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		0	0.0%	1	0.7%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		0	0.0%	1	0.7%	0	
OTHER							
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	11.1%	4	2.7%	0	
NORMAL							
.000 NORMAL GLOBE		8	88.9%	118	80.8%	0	

AMERICAN ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN ENGLISH COONHOUND

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	2		1		0	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		2	100.0%	1	100.0%	0	

AMERICAN ESKIMO DOG

(all varieties)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation in the <i>ADAMTS17</i> gene
C.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the American Eskimo is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However in the American Eskimo Dog the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease

begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825
3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT AMERICAN ESKIMO DOG

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016 2,462		2017-2021 246		2021 0	
		#	%	#	%	#	%	
EYELIDS								
21.000	ENTROPION, UNSPECIFIED	4	0.2%	1	0.4%	0		
25.110	DISTICHIASIS	18	0.7%	1	0.4%	0		
NASOLACRIMAL								
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0		
CORNEA								
70.700	CORNEAL DYSTROPHY	9	0.4%	3	1.2%	0		
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.2%	0	0.0%	0		
UVEA								
93.120	IRIS CYST	4	0.2%	0	0.0%	0		
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	21	0.9%	1	0.4%	0		
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.2%	0	0.0%	0		
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.2%	0	0.0%	0		
LENS								
100.200	CATARACT, UNSPECIFIED	3	0.1%	0	0.0%	0		
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	138	5.6%	15	6.1%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	29	1.2%	6	2.4%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.4%	3	1.2%	0		
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	9	0.4%	2	0.8%	0		
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.3%	4	1.6%	0		
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	2	0.8%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	1	0.4%	0		
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	25	1.0%	9	3.7%	0		
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	23	0.9%	4	1.6%	0		
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	14	0.6%	2	0.8%	0		
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	5	0.2%	0	0.0%	0		
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.1%	0	0.0%	0		
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.3%	0	0.0%	0		
100.317	INCIPIENT CATARACT, CAPSULAR	7	0.3%	1	0.4%	0		
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0		
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0		
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0		
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.4%	0		
100.328	Y-SUTURE TIP OPACITIES	4	0.2%	3	1.2%	0		
100.330	GENERALIZED/ COMPLETE CATARACT	10	0.4%	1	0.4%	0		
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0		
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	171	6.9%	41	16.7%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	6	0.2%	2	0.8%	0		
110.135	PHPV/ PTVL	3	0.1%	0	0.0%	0		
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	18	0.7%	0	0.0%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	8	0.3%	1	0.4%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	183	7.4%	2	0.8%	0		

OCULAR DISORDERS REPORT AMERICAN ESKIMO DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,462		246		0	
			#	%	#	%	#	%
RETINA Continued								
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.0%	0	0.0%	0	
120.960 RETINOPATHY			1	0.0%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			2	0.1%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA			1	0.0%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			3	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			8	0.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			86	3.5%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			25	1.0%	11	4.5%	0	
NORMAL								
.000 NORMAL GLOBE			1,971	80.1%	200	81.3%	0	

AMERICAN FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN FOXHOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	2	100.0%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		6	66.7%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		2	22.2%	2	100.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		1	11.1%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		6	66.7%	0	0.0%	0	

AMERICAN HAIRLESS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Farias FH, Johnson GS, Taylor JF, et al. An *ADAMTS17* splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010 Sep;51:4716-4721. PMID: 20375329
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011 Nov;14:378-384. PMID: 22050825

OCULAR DISORDERS REPORT AMERICAN HAIRLESS TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	1	1.2%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		2	5.9%	0	0.0%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	2.9%	3	3.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX		1	2.9%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	1	1.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR		0	0.0%	1	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX		0	0.0%	1	1.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES		0	0.0%	1	1.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		1	2.9%	4	4.9%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		0	0.0%	1	1.2%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	2.9%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		1	2.9%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	2.9%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		29	85.3%	75	92.6%	0	

AMERICAN HUSKY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN HUSKY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AMERICAN HUSKY

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	0		0	

AMERICAN LEOPARD HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN LEOPARD HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

AMERICAN LEOPARD HOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0		1	33.3%	0	
NORMAL .000 NORMAL GLOBE		0		2	66.7%	0	

AMERICAN PIT BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Retinal atrophy - cone-rod dystrophy 2 (<i>crd2</i>)	Autosomal recessive	2-4	NO	Mutation in the <i>IQCB1</i> gene
B.	Retinal atrophy - cone-rod dystrophy 1 (<i>CRD1/rcd1b</i>)	Autosomal recessive	1	NO	Mutation in the <i>PDE6B</i> gene

Description and Comments

A. Retinal atrophy - cone-rod dystrophy 2 (*crd2*)

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in *IQCB1*. A DNA test is available.

B. Retinal Atrophy - Rod-cone dysplasia 1b [previously considered cone-rod dystrophy 1(*crd1*)]

The disease was previously considered a cone-rod dystrophy (*crd1*) based on incorrect phenotype ascertainment using ERG. The term *crd1* should no longer be used to refer to the disease in this breed. The disease is more appropriately classified as rod-cone dysplasia 1b (*rcd1b*). In affected dogs there is evidence of vision loss at an early age with severe retinal degeneration and complete blindness by early adulthood, and ophthalmoscopic evidence of advanced retinal degeneration by 1 year of age. The disease is caused by a mutation in the *PDE6B* gene, with clinical abnormalities similar to what is found in *rcd1*-affected Irish Setters, and *rcd1a* affected Sloughis and Spanish Water Dogs. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome*. 2012;23:40-61. PMID: 22065099
3. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol*. 2013;54:7005-7019. PMID: 24045995

4. Kijas JW, Zanger B, Miller B, et al. Cloning of the canine ABCA4 gene and evaluation in canine cone-rod dystrophies and progressive retinal atrophies. *Mol Vis*. 2004;10:223-232. PMID: 15064680

OCULAR DISORDERS REPORT AMERICAN PIT BULL TERRIER

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		199		44		0		
		#	%	#	%	#	%	
EYELIDS								
25.110	DISTICHIASIS	6	3.0%	2	4.5%	0		
CORNEA								
70.700	CORNEAL DYSTROPHY	1	0.5%	0	0.0%	0		
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.5%	0	0.0%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	2.0%	3	6.8%	0		
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	1.0%	0	0.0%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	1.0%	0	0.0%	0		
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.5%	0	0.0%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	3.5%	0	0.0%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	1.0%	0	0.0%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	1.0%	0	0.0%	0		
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.5%	0	0.0%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.5%	0	0.0%	0		
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.5%	0	0.0%	0		
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.5%	0	0.0%	0		
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	2.3%	0		
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.5%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8	4.0%	1	2.3%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	2	1.0%	0	0.0%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.5%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	1.0%	0	0.0%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	1	0.5%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	10	5.0%	1	2.3%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	9.1%	0		
NORMAL								
.000	NORMAL GLOBE	171	85.9%	33	75.0%	0		

AMERICAN STAFFORDSHIRE TERRIER*

*Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier. Since the latter breed evolved from the former, it is possible that the same genetic diseases exist in both.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	2, 3	NO	
D.	Retinal atrophy - cone- rod dystrophy 2 (<i>crd2</i>)	Autosomal recessive	6	NO	Mutation in the <i>IQCB1</i> gene
E.	Retinal atrophy - cone- rod dystrophy 1 (<i>CRD1/rcd1b</i>)	Autosomal recessive	4-6	NO	Mutation in the <i>PDE6B</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

In this breed, cataracts usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. A simple autosomal recessive mode of inheritance has been proposed; however, the genetics have not been defined and additional studies will be required.

D. Retinal Atrophy - Cone-rod dystrophy 2 (*crd2*)

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in *IQCB1*. A DNA test is available.

E. Retinal Atrophy - Rod-cone dysplasia 1b [previously considered cone-rod dystrophy 1 (*crd1*)]

The disease was previously considered a cone-rod dystrophy (*crd1*) based on incorrect phenotype ascertainment using ERG (Aguirre, personal communication, 2016). The term *crd1* should no longer be used to refer to the disease in this breed. The disease is more appropriately classified as rod-cone dysplasia 1b (*rcd1b*). In affected dogs there is evidence of vision loss at an early age with severe retinal degeneration and complete blindness by early adulthood, and ophthalmoscopic evidence of advanced retinal degeneration by 1 year of age. The disease is caused by a mutation in the *PDE6B* gene, with clinical abnormalities similar to what is found in *rcd1*-affected Irish Setters, and *rcd1a* affected Sloughis and Spanish Water Dogs. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract.* 1978;19:109-120. PMID: 642468
3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract.* 1985;26:305-316.
4. Kijas JW, Zanger B, Miller B, et al. Cloning of the canine ABCA4 gene and evaluation in canine cone-rod dystrophies and progressive retinal atrophies. *Mol Vis.* 2004;10:223-232. PMID: 15064680
5. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome.* 2012;23:40-61. PMID: 22065099
6. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol.* 2013;54:7005-7019. PMID: 24045995

OCULAR DISORDERS REPORT AMERICAN STAFFORDSHIRE TERRIER

		Year Examined: Total # Dogs:	1991-2016 755		2017-2021 105		2021 0	
Diagnostic Name			#	%	#	%	#	%
EYELIDS								
21.000	ENTROPION, UNSPECIFIED		2	0.3%	0	0.0%	0	
25.110	DISTICHIASIS		34	4.5%	4	3.8%	0	
CORNEA								
70.210	PANNUS		1	0.1%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS		1	0.1%	1	1.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		1	0.1%	0	0.0%	0	
UVEA								
93.110	IRIS HYPOPLASIA		0	0.0%	1	1.0%	0	
93.120	IRIS CYST		1	0.1%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST		1	0.1%	1	1.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		31	4.1%	4	3.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		2	0.3%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		1	0.1%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		1	0.1%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		1	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		29	3.8%	4	3.8%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	0.1%	1	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		2	0.3%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		2	0.3%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		2	0.3%	3	2.9%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		0	0.0%	1	1.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		1	0.1%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		4	0.5%	1	1.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		3	0.4%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		4	0.5%	1	1.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	1.0%	0	
100.328	Y-SUTURE TIP OPACITIES		1	0.1%	2	1.9%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		1	0.1%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		2	0.3%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		23	3.0%	10	9.5%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		2	0.3%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		2	0.3%	1	1.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		8	1.1%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		2	0.3%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		3	0.4%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		8	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		30	4.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		9	1.2%	5	4.8%	0	
NORMAL								
.000	NORMAL GLOBE		645	85.4%	85	81.0%	0	

AMERICAN WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT AMERICAN WATER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,085		2017-2021 123		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.2%	0	0.0%	0	
10.000 GLAUCOMA			3	0.3%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			2	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			7	0.6%	1	0.8%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.2%	0	0.0%	0	
25.110 DISTICHIASIS			350	32.3%	51	41.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.8%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			5	0.5%	2	1.6%	0	
UVEA								
93.120 IRIS CYST			1	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.2%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			11	1.0%	1	0.8%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			6	0.6%	4	3.3%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			5	0.5%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			40	3.7%	8	6.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			5	0.5%	1	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			7	0.6%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			9	0.8%	6	4.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.2%	1	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.3%	4	3.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.6%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			11	1.0%	6	4.9%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.6%	2	1.6%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.1%	1	0.8%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.8%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.8%	0	
100.328 Y-SUTURE TIP OPACITIES			5	0.5%	3	2.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			0	0.0%	1	0.8%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			66	6.1%	26	21.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.2%	0	0.0%	0	
110.135 PHPV/ PTVL			1	0.1%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			0	0.0%	1	0.8%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.1%	1	0.8%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			8	0.7%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT AMERICAN WATER SPANIEL

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,085		123		0	
			#	%	#	%	#	%
RETINA Continued								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			5	0.5%	0	0.0%	0	
120.960 RETINOPATHY			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	1.6%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			5	0.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			18	1.7%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	0.5%	5	4.1%	0	
NORMAL								
.000 NORMAL GLOBE			674	62.1%	52	42.3%	0	

ANATOLIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ANATOLIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ANATOLIAN SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 38		2017-2021 27		2021 0	
			#	%	#	%	#	%
GLOBE .110 MICROPHthalmia			1	2.6%	0	0.0%	0	
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	2.6%	0	0.0%	0	
LENS 100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	7.9%	2	7.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	3.7%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	2.6%	2	7.4%	0	
100.328 Y-SUTURE TIP OPACITIES			1	2.6%	1	3.7%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			2	5.3%	4	14.8%	0	
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	5.3%	0	0.0%	0	
NORMAL .000 NORMAL GLOBE			31	81.6%	25	92.6%	0	

ARMENIAN GAMPR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ARMENIAN GAMPR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ARMENIAN GAMPR

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		3	100.0%	1	100.0%	0	

AUSTRALIAN CATTLE DOG

(Queensland Heeler or Blue Heeler)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	3, 4	NO	Mutation in the <i>ADAMTS17</i> gene
E.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	5, 6	NO	Mutation in the <i>prcd</i> gene
F.	Retinal atrophy - rod-cone dysplasia type 4	Autosomal recessive	1	NO	Mutation in the <i>C2orf71</i> gene

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy).

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Australian Cattle Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However in the Australian Cattle Dog the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not PRCD are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

F. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified also in the Australian Cattle Dog breed. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available. The test is accurate only for this mutation and is of no value in identifying other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. PMID: 14982589
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825
4. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721. PMID: 20375329

5. Dekomien G, Epplen JT. Exclusion of the PDE6A gene for generalised progressive retinal atrophy in 11 breeds of dog. *Anim Genet.* 2000;31:135-139. PMID: 10782214
6. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics.* 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT AUSTRALIAN CATTLE DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,764		2017-2021 531		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.0%	1	0.2%	0	
EYELIDS								
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			15	0.3%	2	0.4%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	1	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			24	0.5%	5	0.9%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			11	0.2%	2	0.4%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			44	0.9%	7	1.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.0%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			6	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	3	0.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	3	0.6%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.1%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			35	0.7%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			289	6.1%	33	6.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			49	1.0%	16	3.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			39	0.8%	6	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			19	0.4%	3	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			7	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			27	0.6%	13	2.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	0.1%	2	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	0.1%	2	0.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			46	1.0%	14	2.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			70	1.5%	5	0.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			52	1.1%	7	1.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	4	0.8%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			19	0.4%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.1%	2	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			5	0.1%	3	0.6%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.6%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.0%	1	0.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	2	0.4%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.0%	2	0.4%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	1	0.2%	0	

OCULAR DISORDERS REPORT AUSTRALIAN CATTLE DOG

Year Examined: Total # Dogs:		1991-2016 4,764		2017-2021 531		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	10	0.2%	18	3.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	23	0.5%	1	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	426	8.9%	107	20.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	8	0.2%	0	0.0%	0	
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	12	0.3%	2	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	37	0.8%	2	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	13	0.3%	2	0.4%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.2%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	252	5.3%	7	1.3%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	3	0.6%	0	
120.960	RETINOPATHY	2	0.0%	6	1.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.2%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	20	0.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	126	2.6%	1	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	40	0.8%	41	7.7%	0	
NORMAL							
.000	NORMAL GLOBE	3,919	82.3%	403	75.9%	0	

AUSTRALIAN KELPIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	2	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Kucharczyk, N., et al. (2019). "Collie Eye Anomaly in Australian Kelpie dogs in Poland." BMC Vet Res 15(1): 392. PMID: 31684941. PMID: 31684941
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OCULAR DISORDERS REPORT AUSTRALIAN KELPIE

		Year Examined: Total # Dogs:	1991-2016 227		2017-2021 21		2021 0	
Diagnostic Name			#	%	#	%	#	%
CORNEA								
70.700	CORNEAL DYSTROPHY		1	0.4%	0	0.0%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	1	4.8%	0	
93.810	UVEAL MELANOMA		3	1.3%	0	0.0%	0	
FUNDUS								
97.110	CHOROIDAL HYPOPLASIA		1	0.4%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		5	2.2%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		29	12.8%	4	19.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		8	3.5%	1	4.8%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		8	3.5%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		1	0.4%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.4%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		1	0.4%	3	14.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		9	4.0%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		7	3.1%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		2	0.9%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		1	0.4%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		1	0.4%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		44	19.4%	4	19.0%	0	
VITREOUS								
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		2	0.9%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		1	0.4%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		5	2.2%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		11	4.8%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		7	3.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		8	3.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	0.4%	1	4.8%	0	
NORMAL								
.000	NORMAL GLOBE		172	75.8%	15	71.4%	0	

AUSTRALIAN KOOLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

- A. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT AUSTRALIAN KOOLIE

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	2	25.0%	0	
NORMAL .000 NORMAL GLOBE		4	100.0%	6	75.0%	0	

AUSTRALIAN LABRADOODLE

(Labradoodle, Australian Cobber Dog)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1, 4	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 5-9	NO	Mutation of the <i>prcd</i> gene
G.	Day blindness/retinal degeneration	Autosomal recessive	1, 10	NO	Mutation has not been published
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 11-20	NO (Breeder option with Normal DNA test)	Mutation of the <i>COL9A3</i> gene
I.	Retinal dysplasia - geographic/ detached (without skeletal defects)	Presumed autosomal recessive	1, 11-21	NO	
J.	Retinal dysplasia - folds/geographic/ detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 11-21	NO	Mutation of the <i>COL9A3</i> gene
K.	Limbal melanoma	Not defined	22	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In Labrador Retrievers in Europe, one form of corneal dystrophy has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the CHST6 gene.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

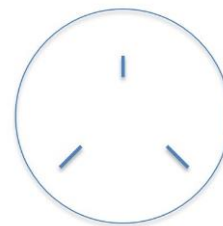
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most frequently reported cataracts in the Labradoodle (Australian) are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts, which usually present between 1-3 years of age. These are generally stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless misdiagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Labradoodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Achromatopsia Type 2 (ACHM – Type 2)

A congenital form of day blindness. Visual deficits become apparent between 8-10 weeks of age. Normal vision is present in low light conditions. Clinical examination is normal. Cone responses are absent on an electroretinogram. The causative genetic mutation of the *CNGA3* gene (3nt deletion in exon 7). A DNA test is available.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state described in "R" below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the COL9A3 mutation.

I. Retinal dysplasia - geographic, detached without skeletal defects

Abnormal development of the retina present at birth; however, in the Golden Retriever, Labrador Retriever, and German Shepherd Dog it has been demonstrated that the geographic form of retinal dysplasia may not be apparent before dogs are 10 weeks of age.

Retinal dysplasia - geographic: Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

Retinal dysplasia - detached: Severe retinal disorganization associated with separation (detachment) of the retina.

These two forms are associated with vision impairment or blindness. Retinal dysplasia is known to be inherited in many breeds. The genetic relationship between the three forms of retinal dysplasia is not known for all breeds

In Europe, this condition has been documented as an autosomal recessive condition and results in early retinal detachment and blindness. Lens and corneal opacities can also be present, but skeletal abnormalities (see below) are not present. The condition of generalized retinal dysplasia with retinal detachment but without skeletal abnormalities has been reported primarily in Europe, and is rarely if ever seen in the United States.

In the United States, the milder forms of retinal dysplasia (folds/geographic) are seen in Labradors. These may represent the heterozygous form of the condition in which the homozygote also displays skeletal malformations (see "R" below) or it may represent a genetically distinct entity with an undetermined mode of inheritance. It is not possible clinically to make this distinction. Thus, Labradors with any form of retinal dysplasia should not be used for breeding.

J. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened

forelimbs (“downhill” conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of COL9A3. A DNA test is available.

K. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition has been noted in the German Shepherd, Labrador and Golden Retriever.

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OCULAR DISORDERS REPORT

AUSTRALIAN LABRADOODLE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 11,188		2017-2021 20,038		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			6	0.1%	3	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			5	0.0%	9	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			189	1.7%	416	2.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			12	0.1%	55	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	3	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			6	0.1%	4	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			272	2.4%	268	1.3%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	8	0.0%	0	
93.120 IRIS CYST			0	0.0%	1	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			781	7.0%	1,497	7.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			34	0.3%	24	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			4	0.0%	6	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			255	2.3%	833	4.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.0%	7	0.0%	0	
93.810 UVEAL MELANOMA			3	0.0%	2	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			3	0.0%	2	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	1	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			227	2.0%	515	2.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			87	0.8%	143	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			36	0.3%	66	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			12	0.1%	19	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			15	0.1%	19	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			89	0.8%	130	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			21	0.2%	42	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			105	0.9%	187	0.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			29	0.3%	31	0.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			29	0.3%	40	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			9	0.1%	23	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			5	0.0%	5	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			16	0.1%	40	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			9	0.1%	41	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			20	0.2%	63	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			6	0.1%	9	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	9	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			3	0.0%	4	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			3	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			10	0.1%	18	0.1%	0	

OCULAR DISORDERS REPORT AUSTRALIAN LABRADOODLE

Year Examined: Total # Dogs:		1991-2016 11,188		2017-2021 20,038		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	2	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	56	0.5%	206	1.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	23	0.2%	3	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	2	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	8	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	585	5.2%	1,102	5.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	23	0.2%	108	0.5%	0	
110.135	PHPV/ PTVL	6	0.1%	13	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	7	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	19	0.2%	14	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	89	0.8%	123	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.1%	3	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	2	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.0%	0	
120.960	RETINOPATHY	14	0.1%	4	0.0%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	36	0.3%	37	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.0%	8	0.0%	0	
130.150	OPTIC DISC COLOBOMA	0	0.0%	17	0.1%	0	
OTHER							
900.100	OTHER, NOT INHERITED	19	0.2%	23	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	284	2.5%	781	3.9%	0	
NORMAL							
.000	NORMAL GLOBE	7,068	63.2%	15,561	77.7%	0	

AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Iris coloboma	Not defined	1	NO	
E.	Iris hypoplasia	Not defined	1	Breeder option	
F.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
G.	Cataract	Autosomal co-dominant	1, 7,8	NO	Mutation in the <i>HSF4</i> gene
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Vitreous degeneration	Not defined	1	Breeder option	
J.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
K.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 9, 10	NO	Mutation in the <i>prcd</i> gene
L.	Cone degeneration - day blindness	Autosomal recessive	16	NO	Mutation in the <i>CNGB3</i> gene
M.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	16	Breeder option	Mutation in the <i>BEST1</i> gene
N.	Retinal dysplasia - folds	Not defined	1	Breeder option	

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
O.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1, 12-15	NO	Mutation in the <i>NHEJ1</i> gene
P.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	
Q.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merle coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position

associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form.

E. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

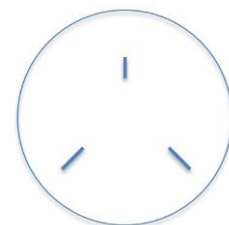
G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

H. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest

version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

L. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

M. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

N. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

O. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

P. Coloboma/staphyloma (unassociated with microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a

congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

Q. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment.

Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

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OCULAR DISORDERS REPORT AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 101,487		2017-2021 24,036		2021 0	
	#	%	#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA	95	0.1%	17	0.1%	0		0	
10.000 GLAUCOMA	8	0.0%	0	0.0%	0		0	
EYELIDS								
20.110 EYELID DERMOID	1	0.0%	0	0.0%	0		0	
20.140 ECTOPIC CILIA	5	0.0%	1	0.0%	0		0	
20.160 MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%	0		0	
21.000 ENTROPION, UNSPECIFIED	16	0.0%	0	0.0%	0		0	
22.000 ECTROPION, UNSPECIFIED	6	0.0%	0	0.0%	0		0	
25.110 DISTICHIASIS	1,639	1.6%	337	1.4%	0		0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	6	0.0%	10	0.0%	0		0	
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0		0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%	0		0	
51.100 THIRD EYELID CARTILAGE ANOMALY	4	0.0%	0	0.0%	0		0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	1	0.0%	0		0	
CORNEA								
70.210 PANNUS	9	0.0%	0	0.0%	0		0	
70.220 PIGMENTARY KERATITIS	1	0.0%	1	0.0%	0		0	
70.700 CORNEAL DYSTROPHY	493	0.5%	129	0.5%	0		0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION	14	0.0%	2	0.0%	0		0	
UVEA								
93.110 IRIS HYPOPLASIA	237	0.2%	170	0.7%	0		0	
93.120 IRIS CYST	37	0.0%	4	0.0%	0		0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0		0	
93.150 IRIS COLOBOMA	1,481	1.5%	221	0.9%	0		0	
93.170 ANTERIOR CHAMBER CYST	4	0.0%	0	0.0%	0		0	
93.180 IIRIS SPHINCTER DYSPLASIA	11	0.0%	21	0.1%	0		0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4,998	4.9%	1,678	7.0%	0		0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	92	0.1%	20	0.1%	0		0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	43	0.0%	7	0.0%	0		0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	92	0.1%	0	0.0%	0		0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	29	0.0%	29	0.1%	0		0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	22	0.0%	6	0.0%	0		0	
93.810 UVEAL MELANOMA	8	0.0%	2	0.0%	0		0	
95.120 CILIARY BODY CYST	1	0.0%	0	0.0%	0		0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	22	0.0%	7	0.0%	0		0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA	160	0.2%	34	0.1%	0		0	
97.120 COLOBOMA	96	0.1%	0	0.0%	0		0	
LENS								
100.200 CATARACT, UNSPECIFIED	169	0.2%	0	0.0%	0		0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2,392	2.4%	480	2.0%	0		0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	311	0.3%	125	0.5%	0		0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	356	0.4%	70	0.3%	0		0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	102	0.1%	44	0.2%	0		0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	39	0.0%	10	0.0%	0		0	

OCULAR DISORDERS REPORT AUSTRALIAN SHEPHERD

Year Examined: Total # Dogs:		1991-2016 101,487		2017-2021 24,036		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	310	0.3%	143	0.6%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	228	0.2%	100	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	134	0.1%	85	0.4%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	328	0.3%	70	0.3%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	766	0.8%	78	0.3%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	199	0.2%	29	0.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	25	0.0%	3	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	159	0.2%	21	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	219	0.2%	37	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	119	0.1%	38	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	12	0.0%	14	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	23	0.0%	28	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	6	0.0%	4	0.0%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	2	0.0%	5	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	7	0.0%	8	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	5	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	85	0.1%	119	0.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	235	0.2%	7	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	18	0.0%	2	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	3,835	3.8%	1,045	4.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	530	0.5%	153	0.6%	0	
110.135	PHPV/ PTVL	110	0.1%	15	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	43	0.0%	17	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	221	0.2%	57	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	984	1.0%	183	0.8%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	45	0.0%	4	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	9	0.0%	4	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	135	0.1%	4	0.0%	0	
120.400	RETINAL HEMORRHAGE	13	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	61	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	12	0.0%	9	0.0%	0	
120.960	RETINOPATHY	9	0.0%	9	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	222	0.2%	103	0.4%	0	
130.120	OPTIC NERVE HYPOPLASIA	121	0.1%	15	0.1%	0	
130.150	OPTIC DISC COLOBOMA	159	0.2%	21	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	545	0.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	1,274	1.3%	22	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	642	0.6%	469	2.0%	0	
NORMAL							
.000	NORMAL GLOBE	88,616	87.3%	20,014	83.3%	0	

AUSTRALIAN STUMPY TAIL CATTLE DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Australian Stumpy Tail Cattle Dog is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Australian Stumpy Tail Cattle Dog. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT AUSTRALIAN STUMPY TAIL CATTLE DOG

Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
		44		7		0	
Diagnostic Name		#	%	#	%	#	%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	4.5%	0	0.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.3%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	2.3%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	2.3%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	4.5%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	4.5%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	2.3%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8	18.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	2.3%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	2.3%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	6.8%	0	0.0%	0	
OTHER							
900.100	OTHER, NOT INHERITED	1	2.3%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	2.3%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	38	86.4%	7	100.0%	0	

AUSTRALIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT AUSTRALIAN TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 874		2017-2021 224		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			2	0.2%	0	0.0%	0	
25.110 DISTICHIASIS			3	0.3%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	1	0.4%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			4	0.5%	1	0.4%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			42	4.8%	17	7.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.3%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.8%	12	5.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	1	0.4%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			32	3.7%	7	3.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			7	0.8%	2	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.3%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.2%	1	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.5%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.2%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.8%	2	0.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			4	0.5%	2	0.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.6%	1	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.1%	1	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.2%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	2	0.9%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			8	0.9%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			51	5.8%	11	4.9%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			3	0.3%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.3%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			3	0.3%	0	0.0%	0	
120.400 RETINAL HEMORRHAGE			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			1	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			4	0.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			8	0.9%	2	0.9%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	0.6%	9	4.0%	0	

OCULAR DISORDERS REPORT AUSTRALIAN TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			758	86.7%	179	79.9%	0	

AZAWAKH

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AZAWAKH breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT AZAWAKH

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		11		10		0	
			#	%	#	%	#	%
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	9.1%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	9.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	9.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	9.1%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			10	90.9%	10	100.0%	0	

BARBET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent Pupillary Membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Y suture tip opacity	Not defined	1	Breeder option	
E.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

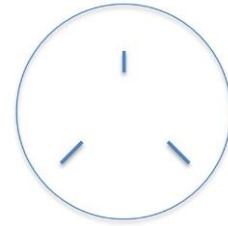
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Barbet is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT BARBET

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 192		2017-2021 198		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			10	5.2%	11	5.6%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			1	0.5%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	1	0.5%	0	
93.120 IRIS CYST			1	0.5%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.5%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			5	2.6%	4	2.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			6	3.1%	3	1.5%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.5%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			28	14.6%	11	5.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			5	2.6%	5	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.5%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	1.6%	1	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	1.6%	2	1.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	2.1%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	1.0%	2	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	1.6%	1	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.5%	1	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.5%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	1	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.5%	1	0.5%	0	
100.328 Y-SUTURE TIP OPACITIES			6	3.1%	7	3.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			31	16.1%	23	11.6%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.5%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.5%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			0	0.0%	2	1.0%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	0.5%	0	0.0%	0	
120.960 RETINOPATHY			1	0.5%	2	1.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	1.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			2	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			2	1.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	3.6%	7	3.5%	0	
NORMAL								
.000 NORMAL GLOBE			146	76.0%	158	79.8%	0	

BASENJI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Corneal dystrophy - endothelial	Not defined	1	NO	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 2-9	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy	Not defined	1, 6, 7	NO	
	- generalized				
	- Bas_PRA1	Autosomal recessive	1, 6, 7	NO	Mutation in the S- antigen (SAG)
G.	Optic nerve coloboma	Not defined	2	NO	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Corneal dystrophy - endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older. In the Basenji, this condition is less common than corneal endothelial disease caused by attachment of persistent pupillary membranes.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Basenji, this is a particularly significant problem with many cases reported where the strands bridge between the iris and the cornea resulting in localized corneal opacities which may cause vision impairment. This has also been associated with optic nerve coloboma (see “G” below).

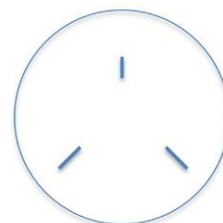
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

Bas_PRA1

A specific mutation has been located in the S-antigen (SAG) gene that causes a late onset form of retinal degeneration in the Basenji. The condition is inherited in an autosomal recessive fashion. Initial thinning of the retina evidenced by irregular hypo and hyper-reflectivity of the tapetal fundus is typically noted at 5 years of age with retinal vascular attenuation noted by 6-7 years of age. Clinically the disease closely resembles *prcd*-PRA. The retinal degeneration progresses gradually and ultimately results in complete vision loss. This mutation is responsible for the majority, but not all cases of PRA within the Basenji breed.

G. Optic nerve coloboma

A congenital cavity in the optic nerve which, if large, may cause blindness or vision impairment.

In the Basenji, this condition has been associated with persistent pupillary membranes (see "C" above).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC and Knight CG. Persistent pupillary membrane and associated defects in the Basenji. *Vet Rec.* 1969 Aug 30;85:242-248. PMID: 4980462
3. Roberts SR and Bistner SI. Persistent pupillary membrane in Basenji dogs. *J Am Vet Med Assoc.* 1968 Sep 1;153:533-542. PMID: 5691151
4. Mason TA. Persistent pupillary membrane in the Basenji. *Aust Vet J.* 1976 Aug;52:343-344. PMID: 985254
5. Bistner SI, Rubin LF and Roberts SR. A review of persistent pupillary membranes in the Basenji dog. *J Am Anim Hosp Assoc.* 1971;7:143.
6. Priester W. Canine progressive retinal atrophy: Occurrence by age, breed, and sex. *American Journal of Veterinary Research.* 1974;35:571-574.
7. Goldstein O, Jordan JA, Aguirre GD, et al. A non-stop S-antigen gene mutation is associated with late onset hereditary retinal degeneration in dogs. *Mol Vis.* 2013;19:1871-1884. PMID: 24019744

OCULAR DISORDERS REPORT BASENJI

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 10,817		2017-2021 1,575		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			8	0.1%	1	0.1%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			6	0.1%	1	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			64	0.6%	13	0.8%	0	
CORNEA								
70.210 PANNUS			2	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			325	3.0%	38	2.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			249	2.3%	10	0.6%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			0	0.0%	2	0.1%	0	
93.120 IRIS CYST			2	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			18	0.2%	0	0.0%	0	
93.150 IRIS COLOBOMA			9	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	6	0.4%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			5,512	51.0%	1,003	63.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			457	4.2%	51	3.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1,136	10.5%	112	7.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			40	0.4%	7	0.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			17	0.2%	34	2.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			187	1.7%	173	11.0%	0	
93.810 UVEAL MELANOMA			0	0.0%	1	0.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
97.120 COLOBOMA			13	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			47	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			480	4.4%	48	3.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			50	0.5%	9	0.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			22	0.2%	9	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			11	0.1%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			5	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			89	0.8%	30	1.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			21	0.2%	14	0.9%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			72	0.7%	26	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			30	0.3%	5	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			27	0.2%	9	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			18	0.2%	3	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			30	0.3%	8	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			22	0.2%	3	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			23	0.2%	7	0.4%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			15	0.1%	24	1.5%	0	

OCULAR DISORDERS REPORT BASENJI

Year Examined: Total # Dogs:		1991-2016 10,817		2017-2021 1,575		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.330	GENERALIZED/ COMPLETE CATARACT	22	0.2%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		507	4.7%	148	9.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	10	0.1%	5	0.3%	0	
110.135	PHPV/ PTVL	8	0.1%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	2	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	25	0.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	20	0.2%	5	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	19	0.2%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	380	3.5%	2	0.1%	0	
120.400	RETINAL HEMORRHAGE	5	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	7	0.1%	0	0.0%	0	
120.960	RETINOPATHY	9	0.1%	4	0.3%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	102	0.9%	8	0.5%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	78	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	225	2.1%	5	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	275	2.5%	39	2.5%	0	
NORMAL							
.000	NORMAL GLOBE	4,206	38.9%	374	23.7%	0	

BASSET FAUVE DE BRETAGNE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma - POAG	Autosomal recessive	2-8	NO	Mutation in the <i>ADAMTS17</i> gene
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Basset Fauve de Bretagne, both closed angle (PCAG) and open angle (POAG) forms of glaucoma are present. Some Basset Fauve de Bretagnes have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness.

The inheritance of PCAG and goniodysgenesis in the Basset Fauve de Bretagne are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny affected with glaucoma. Three genetic loci, *COL1A2*, *RAB22A*, and *NEB*, have been implicated as possible contributors to the development of PCAG in the Basset Fauve de Bretagne. One is an autosomal recessive missense mutation of a nebulin (*NEB*) residue on chromosome 19. Because 33% of unaffected animals were homozygous for the risk allele, it was hypothesized that modifying factors may be present. A genetic test is not yet available for PCAG.

POAG in the Basset Fauve de Bretagne is caused by a 19 base pair deletion in exon 2 of *ADAMTS17*. This deletion alters the reading frame and is suspected to cause a truncated

protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Ahram DF, Cook AC, Kecova H, et al. Identification of genetic loci associated with primary angle-closure glaucoma in the basset hound. *Mol Vis*. 2014;20:497-510. PMID: 24791135
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5. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030. PMID: 3710885
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9. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing ADAMTS17 mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. *Canine Genet Epidemiol*. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.

OCULAR DISORDERS REPORT BASSET FAUVE DE BRETAGNE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			2	3.6%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	1	1.2%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	1.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	3.6%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			17	30.9%	5	6.1%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			6	10.9%	4	4.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	1.8%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	1.8%	2	2.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	1.8%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	1.8%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	1.8%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	2	2.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	3.6%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	2	2.4%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			7	12.7%	6	7.3%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	1.2%	0	
OTHER								
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	7.3%	2	2.4%	0	
NORMAL								
.000 NORMAL GLOBE			29	52.7%	69	84.1%	0	

BASSET HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma - POAG	Autosomal recessive	1-10	NO	Mutation in the <i>ADAMTS17</i> gene
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1, 11	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
F.	Cataract	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Basset Hound, both closed angle (PCAG) and open angle (POAG) forms of glaucoma are present. Some Basset Hounds have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness.

The inheritance of PCAG and goniodysgenesis in the Basset Hound are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny affected with glaucoma. Three genetic loci, *COL1A2*, *RAB22A*, and *NEB*, have been implicated as possible contributors to the development of PCAG in the Basset Hound. One is an autosomal recessive missense mutation of a nebulin (*NEB*) residue on chromosome

19. Because 33% of unaffected animals were homozygous for the risk allele, it was hypothesized that modifying factors may be present. A genetic test is not yet available for PCAG.

POAG in the Basset Hound is caused by a 19 base pair deletion in exon 2 of *ADAMTS17*. This deletion alters the reading frame and is suspected to cause a truncated protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Basset Hound, ectropion is associated with an exceptionally large palpebral fissure (macroblepharon) and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid segment. This causes severe ocular irritation.

It is acknowledged that factors other than genetics may play a role or be the cause of entropion and/or ectropion. However, when non-genetic factors can be ruled out, selection should be directed to a more normal head conformation that minimizes or eliminates the likelihood of the defects.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

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OCULAR DISORDERS REPORT BASSET HOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,819		2017-2021 171		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			17	0.9%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			23	1.3%	5	2.9%	0	
22.000 ECTROPION, UNSPECIFIED			131	7.2%	18	10.5%	0	
25.110 DISTICHIASIS			25	1.4%	1	0.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.6%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			6	0.3%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			20	1.1%	3	1.8%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			9	0.5%	3	1.8%	0	
CORNEA								
70.210 PANNUS			3	0.2%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			3	0.2%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			4	0.2%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			5	0.3%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			4	0.2%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.6%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			51	2.8%	6	3.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.6%	2	1.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			28	1.5%	1	0.6%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.1%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			6	0.3%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			52	2.9%	10	5.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			19	1.0%	2	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			10	0.5%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			5	0.3%	1	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			7	0.4%	3	1.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	0.2%	2	1.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			9	0.5%	3	1.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.4%	1	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			13	0.7%	1	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.1%	1	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.2%	3	1.8%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.6%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BASSET HOUND

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	1,819		171		0	
		#	%	#	%	#	%
LENS Continued							
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0		
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.6%	0		
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.3%	0	0.0%	0		
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0		
100.345 SIGNIFICANT CATARACTS (SUMMARY)	105	5.8%	19	11.1%	0		
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	7	0.4%	0	0.0%	0		
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0		
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0		
110.320 VITREOUS DEGENERATION SYNERESIS	3	0.2%	0	0.0%	0		
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS	11	0.6%	0	0.0%	0		
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.1%	0	0.0%	0		
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0		
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0		
OPTIC NERVE							
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	2	1.2%	0		
OTHER							
900.000 OTHER, UNSPECIFIED	19	1.0%	0	0.0%	0		
900.100 OTHER, NOT INHERITED	43	2.4%	7	4.1%	0		
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	100	5.5%	7	4.1%	0		
NORMAL							
.000 NORMAL GLOBE	1,396	76.7%	111	64.9%	0		

BAVARIAN MOUNTAIN SCENT HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BAVARIAN MOUNTAIN SCENT HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BAVARIAN MOUNTAIN SCENT HOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	1	1.7%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		0	0.0%	3	5.0%	0	
NORMAL							
.000 NORMAL GLOBE		7	100.0%	56	93.3%	0	

BEAGLE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	See below	1, 2	NO	
B.	Glaucoma – POAG	Presumed autosomal recessive	3-17	NO	Mutation in the <i>ADAMTS10</i> gene
C.	Distichiasis	Not defined	1	Breeder option	
D.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
E.	Corneal dystrophy - epithelial/stromal	Not defined	18-23	Breeder option	
E.	Cataract	Not defined	1, 24, 25	NO	
E.	Tapetal degeneration	Presumed autosomal recessive	26-29	Breeder option	
H.	Retinal dysplasia - folds	Not defined	1	Breeder option	
I.	Congenital stationary night blindness	Autosomal recessive	30,31	NO	Mutation in the <i>LRIT3</i> gene

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

A developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens, and/or retina.

In the Beagle, the condition may be present unilaterally or bilaterally and is characterized by a small globe and associated ocular defects which are variable. Several forms of the condition, all apparently different, are recognized:

1) In one study, complete lens opacities were noted by 5-6 months of age; the severity of the cataract correlated closely with the extent of microphthalmia. Severely microphthalmic eyes also had multiple retinal folds. The disorder appeared to be inherited; the exact mode was

not fully defined, although an X-linked disorder could not be ruled out.

2) A different form of microphthalmia is recognized in association with microphakia and persistent pupillary membrane (PPM). Based on a limited pedigree of one cross, a dominant inheritance was proposed; heterozygotes have PPM and microphakia/cataract and homozygous affected show microphthalmia and multiple congenital ocular anomalies.

3) A third form of microphthalmia is recognized in the breed. This condition is usually unilateral and the fellow eye is normal. The mode of inheritance has not been defined, but autosomal recessive inheritance is suspected.

B. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the breed, and extensive breeding studies have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges, the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

E. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Beagle, corneal dystrophy has been described as an oval opacity located at the junction at the middle and inferior thirds of the cornea. The opacities are caused by accumulation of cholesterol and other lipids within the cornea. Progression was noted with

possible vision impairment.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Several different types of cataract (anterior capsular, posterior cortical, other) have been reported in the Beagle, but the mode of inheritance of the defects is unknown. When one considers that this breed, particularly the laboratory-bred Beagle, has been the subject of extensive ophthalmological examination, the relatively low incidence of cataracts is surprising.

G. Tapetal degeneration

The tapetum lucidum is a modified choroidal structure present in the eyes of many animals that have good night vision. In Beagles there is a recessively inherited defect of the tapetal layer. Absence of this layer is determined by ophthalmoscopy which shows that the fundus has a uniform reddish coloration. The degeneration of the tapetum occurs as a result of abnormal postnatal development of this structure. The degeneration of the tapetum does not affect vision and does not result in functional or structural damage to the retina. As such, the condition probably represents an insignificant inherited variation of no functional significance.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Congenital stationary night blindness (CSNB)

A non-progressive retinal disease characterized by night blindness; day vision is normal. This condition is very rare and has only been found to date in a research colony in Japan. The condition is inherited in an autosomal recessive manner. Affected dogs had normal retinas on clinical examination, but no detectable rod photoreceptor responses with an electroretinogram (ERG). A DNA test is available.

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OCULAR DISORDERS REPORT BEAGLE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,675		2017-2021 555		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.2%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			4	0.2%	2	0.4%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			306	18.3%	90	16.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			4	0.2%	9	1.6%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.2%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			10	0.6%	1	0.2%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			6	0.4%	1	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	1	0.2%	0	
UVEA								
93.120 IRIS CYST			1	0.1%	3	0.5%	0	
93.150 IRIS COLOBOMA			0	0.0%	1	0.2%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			20	1.2%	4	0.7%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.1%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	1	0.2%	0	
95.120 CILIARY BODY CYST			0	0.0%	2	0.4%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.5%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			49	2.9%	14	2.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			13	0.8%	2	0.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			6	0.4%	1	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.1%	3	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	2	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			6	0.4%	1	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	1	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.2%	2	0.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.2%	5	0.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			14	0.8%	2	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			7	0.4%	3	0.5%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.2%	1	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	1	0.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			19	1.1%	1	0.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			95	5.7%	26	4.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BEAGLE

Year Examined: Total # Dogs:		1991-2016 1,675		2017-2021 555		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	1	0.1%	1	0.2%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.2%	2	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	33	2.0%	5	0.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	6	0.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.5%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	18	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	44	2.6%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	27	1.6%	21	3.8%	0	
NORMAL							
.000	NORMAL GLOBE	1,231	73.5%	413	74.4%	0	

BEARDED COLLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1		
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1-3	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

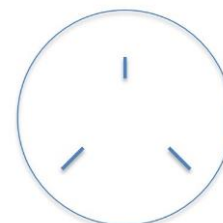
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached), which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Choroidal hypoplasia (Collie Eye Anomaly)

- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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3. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for collie eye anomaly. *Genomics.* 2003;82:86-95. PMID: 12809679

OCULAR DISORDERS REPORT BEARDED COLLIE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,877		2017-2021 439		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			2	0.1%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			29	0.7%	4	0.9%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			49	1.3%	6	1.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			6	0.2%	1	0.2%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			158	4.1%	19	4.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			9	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	2	0.5%	0	
95.120 CILIARY BODY CYST			3	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			22	0.6%	4	0.9%	0	
97.120 COLOBOMA			4	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			12	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			391	10.1%	48	10.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			51	1.3%	20	4.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			15	0.4%	5	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			34	0.9%	7	1.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			6	0.2%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			32	0.8%	17	3.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			8	0.2%	3	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.4%	13	3.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			40	1.0%	1	0.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			34	0.9%	3	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			25	0.6%	7	1.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			13	0.3%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			14	0.4%	5	1.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			10	0.3%	3	0.7%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			13	0.3%	19	4.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			6	0.2%	1	0.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			337	8.7%	106	24.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			6	0.2%	1	0.2%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	0.0%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			6	0.2%	1	0.2%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			52	1.3%	4	0.9%	0	

OCULAR DISORDERS REPORT BEARDED COLLIE

Diagnostic Name		Year Examined: Total # Dogs:		1991-2016 3,877		2017-2021 439		2021 0	
		#	%	#	%	#	%		
RETINA Continued									
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	1	0.2%	0		0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.2%	0	0.0%	0		0	
120.960	RETINOPATHY	2	0.1%	0	0.0%	0		0	
OPTIC NERVE									
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0		0	
OTHER									
900.000	OTHER, UNSPECIFIED	37	1.0%	0	0.0%	0		0	
900.100	OTHER, NOT INHERITED	73	1.9%	0	0.0%	0		0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	31	0.8%	29	6.6%	0		0	
NORMAL									
.000	NORMAL GLOBE	3,113	80.3%	304	69.2%	0		0	

BEAUCERON

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataracts	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens

completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BEAUCERON

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 163		2017-2021 515		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.6%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			2	1.2%	4	0.8%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.2%	0	
CORNEA								
70.210 PANNUS			1	0.6%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			1	0.6%	1	0.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	1.2%	15	2.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			0	0.0%	1	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			8	4.9%	38	7.4%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	2.5%	17	3.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.6%	3	0.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.6%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	1.8%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.6%	5	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.6%	8	1.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	2	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	1.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.6%	1	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.6%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			2	1.2%	1	0.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			0	0.0%	2	0.4%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			13	8.0%	26	5.0%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			0	0.0%	1	0.2%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			6	3.7%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	4	0.8%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.6%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	1.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	3.1%	18	3.5%	0	
NORMAL								
.000 NORMAL GLOBE			132	81.0%	417	81.0%	0	

BEDLINGTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Imperforate lacrimal punctum	Not defined	2	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

B. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC. Imperforate and micro-lachrymal puncta in the dog. *J Small Anim Pract.* 1979 Aug;20:481-490. PMID: 513659

OCULAR DISORDERS REPORT BEDLINGTON TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,648		2017-2021 315		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.2%	1	0.3%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			2	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			129	7.8%	15	4.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			12	0.7%	3	1.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.1%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			7	0.4%	1	0.3%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			130	7.9%	45	14.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.3%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			3	0.2%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			13	0.8%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			119	7.2%	15	4.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			14	0.8%	6	1.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	0.2%	1	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			13	0.8%	3	1.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			29	1.8%	13	4.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	1	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			6	0.4%	3	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			39	2.4%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			18	1.1%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			32	1.9%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			9	0.5%	1	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			5	0.3%	3	1.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			14	0.8%	2	0.6%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			212	12.9%	33	10.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	2	0.6%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			2	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			5	0.3%	1	0.3%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			8	0.5%	2	0.6%	0	

OCULAR DISORDERS REPORT BEDLINGTON TERRIER

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	1,648		315		0	
		#	%	#	%	#	%
RETINA Continued							
120.190 RETINAL DYSPLASIA, DETACHED		1	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		3	0.2%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	
120.960 RETINOPATHY		1	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		0	0.0%	2	0.6%	0	
130.120 OPTIC NERVE HYPOPLASIA		1	0.1%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA		5	0.3%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		13	0.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		34	2.1%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		17	1.0%	10	3.2%	0	
NORMAL							
.000 NORMAL GLOBE		1,226	74.4%	223	70.8%	0	

BELGIAN LAEKENOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataracts	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BELGIAN LAEKENOIS

Year Examined: Total # Dogs:		1991-2016 159		2017-2021 71		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	5	3.1%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	2	2.8%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.6%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	0.6%	2	2.8%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	1.4%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	10.1%	4	5.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.6%	2	2.8%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.4%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.6%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.6%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.6%	1	1.4%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	2	2.8%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	3	4.2%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.6%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	2.8%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	5	3.1%	13	18.3%	0	
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.6%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	2.5%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	6	3.8%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	3	4.2%	0	
120.960	RETINOPATHY	0	0.0%	1	1.4%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	4	2.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	4	2.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	1.3%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	131	82.4%	55	77.5%	0	

BELGIAN MALINOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Malinois, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BELGIAN MALINOIS

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,771		2017-2021 927		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			2	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			2	0.1%	2	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	1	0.1%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	2	0.2%	0	
CORNEA								
70.210 PANNUS			10	0.4%	2	0.2%	0	
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			17	0.6%	3	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			9	0.3%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			31	1.1%	23	2.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			0	0.0%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	2	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			122	4.4%	50	5.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			27	1.0%	19	2.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			13	0.5%	5	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.1%	2	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			7	0.3%	4	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			20	0.7%	10	1.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.2%	9	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	0.2%	7	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			15	0.5%	6	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			23	0.8%	8	0.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			7	0.3%	2	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.3%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			9	0.3%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			16	0.6%	7	0.8%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	3	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	2	0.2%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			7	0.3%	10	1.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			6	0.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			180	6.5%	97	10.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.1%	2	0.2%	0	
110.135 PHPV/ PTVL			2	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BELGIAN MALINOIS

Year Examined: Total # Dogs:		1991-2016 2,771		2017-2021 927		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	16	0.6%	8	0.9%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	24	0.9%	2	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	6	0.2%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	13	0.5%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	4	0.1%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	3	0.3%	0	
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	21	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	78	2.8%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	35	1.3%	43	4.6%	0	
NORMAL							
.000	NORMAL GLOBE	2,450	88.4%	775	83.6%	0	

BELGIAN SHEEPDOG

(BELGIAN SHEPHERD-GROENENDAEL)

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Chronic superficial keratitis/pannus	Not defined	1	NO
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Achiasmic optic nerves with nystagmus	Autosomal recessive	2	NO

Description and Comments

A. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Sheepdog, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

D. Achiasmatic optic nerves with nystagmus

Achiasmatic optic nerves with nystagmus have been described in a small family of black Belgian Sheepdogs. Congenital nystagmus is the clinical sign most commonly noted. All retinal ganglion cell axons extend directly into the ipsilateral optic disc with no chiasmal decussation. No optic nerve hypoplasia/micropapilla was noted in the animals studied and reported.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Hogan D and Williams RW. Analysis of the retinas and optic nerves of achiasmatic Belgian sheepdogs. *The Journal of comparative neurology*. 1995 Feb 13;352:367-380.

OCULAR DISORDERS REPORT BELGIAN SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,856		2017-2021 953		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			12	0.2%	2	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			3	0.1%	6	0.6%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			3	0.1%	1	0.1%	0	
CORNEA								
70.210 PANNUS			56	1.0%	13	1.4%	0	
70.220 PIGMENTARY KERATITIS			3	0.1%	6	0.6%	0	
70.700 CORNEAL DYSTROPHY			32	0.5%	6	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			3	0.1%	1	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			425	7.3%	79	8.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			4	0.1%	2	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			11	0.2%	6	0.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			13	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			209	3.6%	34	3.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			36	0.6%	11	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			46	0.8%	11	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			5	0.1%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.1%	3	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			20	0.3%	4	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			7	0.1%	2	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			15	0.3%	11	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			26	0.4%	4	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			60	1.0%	10	1.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			13	0.2%	2	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	0.2%	4	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			11	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.1%	4	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	2	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	2	0.2%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			6	0.1%	5	0.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BELGIAN SHEEPDOG

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	5,856		953		0	
		#	%	#	%	#	%	
LENS Continued								
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	295	5.0%	75	7.9%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	1	0.1%	0		
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	3	0.1%	1	0.1%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	38	0.6%	1	0.1%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	7	0.1%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.1%	0	0.0%	0		
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%	0		
120.960	RETINOPATHY	0	0.0%	1	0.1%	0		
OPTIC NERVE								
130.110	MICROPAPILLA	29	0.5%	5	0.5%	0		
130.120	OPTIC NERVE HYPOPLASIA	13	0.2%	1	0.1%	0		
130.150	OPTIC DISC COLOBOMA	5	0.1%	0	0.0%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	54	0.9%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	112	1.9%	2	0.2%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	0.9%	54	5.7%	0		
NORMAL								
.000	NORMAL GLOBE	5,000	85.4%	724	76.0%	0		

BELGIAN TERVUREN

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Chronic superficial keratitis/pannus	Not defined	1, 2	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to

lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Tervuren, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

E. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Chavkin MJ, Roberts SM, Salman MD, et al. Risk factors for development of chronic superficial keratitis in dogs. *J Am Vet Med Assoc*. 1994 May 15;204:1630-1634.

OCULAR DISORDERS REPORT BELGIAN TERVUREN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 12,957		2017-2021 1,854		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.0%	0	0.0%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			3	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			116	0.9%	9	0.5%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	1	0.1%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			7	0.1%	6	0.3%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			20	0.2%	3	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			96	0.7%	18	1.0%	0	
70.220 PIGMENTARY KERATITIS			8	0.1%	3	0.2%	0	
70.700 CORNEAL DYSTROPHY			72	0.6%	8	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			7	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			15	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			980	7.6%	225	12.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			13	0.1%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			14	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			33	0.3%	35	1.9%	0	
93.810 UVEAL MELANOMA			1	0.0%	3	0.2%	0	
95.120 CILIARY BODY CYST			1	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			66	0.5%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			686	5.3%	136	7.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			129	1.0%	70	3.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			102	0.8%	27	1.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			21	0.2%	6	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			8	0.1%	10	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			46	0.4%	9	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			11	0.1%	10	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			43	0.3%	31	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			62	0.5%	18	1.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			136	1.0%	34	1.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.2%	11	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			6	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			29	0.2%	5	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.0%	2	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			16	0.1%	9	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	1	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	5	0.3%	0	

OCULAR DISORDERS REPORT BELGIAN TERVUREN

Year Examined: Total # Dogs:		1991-2016 12,957		2017-2021 1,854		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	10	0.1%	14	0.8%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.1%	2	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	724	5.6%	266	14.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	11	0.1%	7	0.4%	0	
110.135	PHPV/ PTVL	3	0.0%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	29	0.2%	13	0.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	42	0.3%	2	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	12	0.1%	2	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	23	0.2%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	3	0.0%	3	0.2%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	125	1.0%	20	1.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	94	0.7%	4	0.2%	0	
130.150	OPTIC DISC COLOBOMA	4	0.0%	1	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	107	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	251	1.9%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	174	1.3%	116	6.3%	0	
NORMAL							
.000	NORMAL GLOBE	10,731	82.8%	1,273	68.7%	0	

BERGAMASCO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGAMASCO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BERGAMASCO

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
CORNEA 70.700 CORNEAL DYSTROPHY		1	14.3%	0	0.0%	0	
NORMAL .000 NORMAL GLOBE		6	85.7%	9	100.0%	0	

BERGER DE PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGER DE PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BERGER DES PYRENEES

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0		2	15.4%	0	
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0		1	7.7%	0	
NORMAL .000 NORMAL GLOBE		0		10	76.9%	0	

BERGER PICARD

(PICARDY SHEPHERD, PICARDIE)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Y suture tip opacity	Not defined	1	Breeder option
G.	Retinal atrophy - generalized	Not defined	1	NO
H.	Retinal dysplasia - folds	Not defined	1	Breeder option
I.	Retinopathy	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

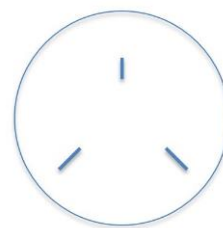
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality is also known as progressive retinal atrophy or PRA, and may be detected by electroretinogram (not part of a routine eye screening examination) before there are detectable funduscopic changes seen by ophthalmoscopy. There are multiple genetic types of PRA including the rod cone dysplasias described elsewhere.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Retinopathy

A lesion similar to canine multifocal retinopathy has been noted in the Berger Picard. The lesions initially appear as multifocal sub-retinal fluid elevations that over time may become hyper-reflective lesions.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BERGER PICARD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 940		2017-2021 772		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			0	0.0%	1	0.1%	0	
EYELIDS								
25.110 DISTICHIASIS			71	7.6%	50	6.5%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.2%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			18	1.9%	16	2.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			0	0.0%	3	0.4%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			15	1.6%	19	2.5%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.1%	0	0.0%	0	
93.120 IRIS CYST			2	0.2%	1	0.1%	0	
93.150 IRIS COLOBOMA			0	0.0%	1	0.1%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	3	0.4%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			223	23.7%	76	9.8%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	2	0.3%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.1%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.1%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			105	11.2%	77	10.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	0.3%	15	1.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.3%	6	0.8%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.3%	1	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	3	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			63	6.7%	61	7.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.6%	3	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			10	1.1%	12	1.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	0.2%	6	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			8	0.9%	9	1.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.2%	4	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	1.5%	17	2.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	2	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.2%	3	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			3	0.3%	3	0.4%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	2	0.3%	0	
100.328 Y-SUTURE TIP OPACITIES			54	5.7%	75	9.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			0	0.0%	1	0.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			175	18.6%	227	29.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			5	0.5%	4	0.5%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.1%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			184	19.6%	65	8.4%	0	

OCULAR DISORDERS REPORT BERGER PICARD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		940		772		0	
			#	%	#	%	#	%
RETINA Continued								
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			8	0.9%	5	0.6%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.1%	1	0.1%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			16	1.7%	19	2.5%	0	
120.960 RETINOPATHY			41	4.4%	30	3.9%	0	
120.970 CMR/ CMR-LIKE RETINOPATY			0	0.0%	4	0.5%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	0.3%	0	
130.120 OPTIC NERVE HYPOPLASIA			0	0.0%	1	0.1%	0	
130.150 OPTIC DISC COLOBOMA			1	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			25	2.7%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			19	2.0%	4	0.5%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			41	4.4%	48	6.2%	0	
NORMAL								
.000 NORMAL GLOBE			422	44.9%	404	52.3%	0	

BERNESE MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO
E.	Retinal atrophy - generalized	Not defined	1, 2	NO

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Bernese Mountain Dog, one French report found the early onset retinopathy to be functionally and electroretinographically similar to the retinal dystrophy (congenital stationary night blindness) seen in the Briard.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Chaudieu G and Molon-Noblot S. Early retinopathy in the Bernese Mountain Dog in France: preliminary observations. *Vet Ophthalmol.* 2004 May-Jun;7:175-184.

OCULAR DISORDERS REPORT BERNESE MOUNTAIN DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 16,682		2017-2021 3,313		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			7	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			25	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			248	1.5%	46	1.4%	0	
22.000 ECTROPION, UNSPECIFIED			108	0.6%	13	0.4%	0	
25.110 DISTICHIASIS			154	0.9%	37	1.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	1	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			42	0.3%	5	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	2	0.1%	0	
CORNEA								
70.210 PANNUS			2	0.0%	1	0.0%	0	
70.700 CORNEAL DYSTROPHY			63	0.4%	16	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			50	0.3%	3	0.1%	0	
93.150 IRIS COLOBOMA			8	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			3	0.0%	3	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			623	3.7%	162	4.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			14	0.1%	6	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.0%	5	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			21	0.1%	32	1.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			9	0.1%	4	0.1%	0	
95.120 CILIARY BODY CYST			2	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			6	0.0%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			997	6.0%	156	4.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			157	0.9%	75	2.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			105	0.6%	22	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			57	0.3%	17	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			22	0.1%	8	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			38	0.2%	15	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			44	0.3%	22	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			47	0.3%	39	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			59	0.4%	13	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			179	1.1%	20	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			109	0.7%	18	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			9	0.1%	2	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			30	0.2%	4	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			31	0.2%	17	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			54	0.3%	17	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	3	0.1%	0	

OCULAR DISORDERS REPORT BERNESE MOUNTAIN DOG

Year Examined: Total # Dogs:		1991-2016 16,682		2017-2021 3,313		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.0%	1	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	1	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	3	0.0%	10	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	2	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.0%	9	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	28	0.2%	1	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	1	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	995	6.0%	318	9.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	27	0.2%	12	0.4%	0	
110.135	PHPV/ PTVL	9	0.1%	3	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	22	0.1%	1	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	35	0.2%	11	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.0%	1	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	51	0.3%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	0	
120.960	RETINOPATHY	4	0.0%	9	0.3%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	19	0.1%	11	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	32	0.2%	5	0.2%	0	
130.150	OPTIC DISC COLOBOMA	22	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	193	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	454	2.7%	5	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	183	1.1%	118	3.6%	0	
NORMAL							
.000	NORMAL GLOBE	14,269	85.5%	2,629	79.4%	0	

BICHON FRISE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1-3	NO
F.	Y suture tip opacity	Not defined	1	Breeder option
G.	Vitreous degeneration	Not defined	1	Breeder option
H.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Bichon Frise, many of these strands bridge between the iris and cornea where they may be associated with corneal opacities and vision impairment.

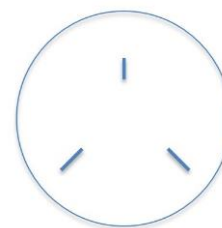
E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The range in age of animals affected with cataracts in one study was 1-2 years to 9-10 years old, with the peak age of 3 years old. The cataracts involved all regions of the lens, but in age groups of 2-4 years old, the predominant regions affected were the posterior cortex, and the anterior and posterior cortices combined. The earliest abnormalities usually consisted of small punctate opacities in the paracentral posterior cortex, independent of the posterior lens sutures.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts -

which would either be breeder option or failing.

G. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

H. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gelatt KN, Wallace MR, Andrew SE, et al. Cataracts in the Bichon Frise. *Vet Ophthalmol.* 2003 Mar;6:3-9.
3. Schmidt GM and Vainisi SJ. Retrospective study of prophylactic random transscleral retinopexy in the Bichon Frise with cataract. *Vet Ophthalmol.* 2004 Sep-Oct;7:307-310.

OCULAR DISORDERS REPORT

BICHON FRISE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 10,181		2017-2021 1,706		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			8	0.1%	18	1.1%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			362	3.6%	79	4.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	3	0.2%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			0	0.0%	3	0.2%	0	
CORNEA								
70.210 PANNUS			2	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	3	0.2%	0	
70.700 CORNEAL DYSTROPHY			351	3.4%	64	3.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			6	0.1%	1	0.1%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			4	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			232	2.3%	73	4.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			13	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			31	0.3%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.0%	6	0.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			8	0.1%	3	0.2%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			23	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			549	5.4%	66	3.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			136	1.3%	37	2.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			91	0.9%	16	0.9%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			16	0.2%	7	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			10	0.1%	3	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			47	0.5%	18	1.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			17	0.2%	11	0.6%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			23	0.2%	16	0.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			89	0.9%	11	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			221	2.2%	19	1.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			34	0.3%	8	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			47	0.5%	4	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			9	0.1%	2	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			13	0.1%	6	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.0%	3	0.2%	0	

OCULAR DISORDERS REPORT BICHON FRISE

Year Examined: Total # Dogs:		1991-2016 10,181		2017-2021 1,706		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	5	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	7	0.1%	32	1.9%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	149	1.5%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	939	9.2%	200	11.7%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	23	0.2%	16	0.9%	0	
110.135	PHPV/ PTVL	3	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.1%	9	0.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	99	1.0%	29	1.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	68	0.7%	5	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	59	0.6%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	3	0.0%	3	0.2%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	10	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	39	0.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	145	1.4%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	78	0.8%	84	4.9%	0	
NORMAL							
.000	NORMAL GLOBE	8,372	82.2%	1,240	72.7%	0	

Biewer Terrier

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT BIEWER TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	1.7%	6	2.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	2	0.9%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	2	0.9%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			8	13.3%	15	6.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			0	0.0%	1	0.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	3.3%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	0.4%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	1.7%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	6.7%	2	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	6.7%	1	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	1.7%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	1.7%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			6	10.0%	4	1.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	1.7%	1	0.4%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	2	0.9%	0	
120.960 RETINOPATHY			0	0.0%	1	0.4%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	0.4%	0	
130.150 OPTIC DISC COLOBOMA			1	1.7%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	1.7%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			49	81.7%	195	84.8%	0	

BLACK AND TAN COONHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO
B.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BLACK AND TAN COONHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 593		2017-2021 140		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.2%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			3	0.5%	1	0.7%	0	
22.000 ECTROPION, UNSPECIFIED			6	1.0%	1	0.7%	0	
25.110 DISTICHIASIS			6	1.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.3%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.3%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			0	0.0%	1	0.7%	0	
UVEA								
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.7%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			5	0.8%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.5%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	2	1.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			8	1.3%	1	0.7%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.2%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			45	7.6%	5	3.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			6	1.0%	1	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.3%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	3	2.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.3%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			7	1.2%	1	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.5%	3	2.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			5	0.8%	3	2.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.2%	1	0.7%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.7%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	1	0.7%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.2%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	0.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			37	6.2%	13	9.3%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	0.7%	0	
110.135 PHPV/ PTVL			1	0.2%	1	0.7%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			35	5.9%	38	27.1%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			2	0.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			11	1.9%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	0.8%	7	5.0%	0	

OCULAR DISORDERS REPORT

BLACK AND TAN COONHOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			466	78.6%	81	57.9%	0	

BLACK RUSSIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene
E.	POANV (polyneuropathy, ocular abnormalities neuronal vacuolation) - Microphthalmia - Cataracts -PPM (iris to iris)	Autosomal recessive	3	NO	Mutation in the <i>RAB3GAP1</i> : <i>c.743delC</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes

of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

E. POANV- Polyneuropathy with ocular abnormalities and neuronal vacuolation

An autosomal recessive condition resulting in juvenile polyneuropathy that presents as laryngeal paralysis and weakness. Patients have concurrent ophthalmic abnormalities including microphthalmia, incomplete cataracts (primarily nuclear) and iris-to-iris PPMs. Neuronal vacuolation was identified on histopathology. Affected dogs were found to be homozygous for the RAB3GAP1: c.743delC mutation. Patients with this variant are not reported to survive past 6 months.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.
3. Mhlanga-Mutangadura T, Johnson GJ, Schnabel RD, et al. A mutation in the Warburg syndrome gene, RAB3GAP1, causes a similar syndrome with polyneuropathy and neuronal vacuolation in Black Russian Terrier dogs. Neurobiology of Disease. 2016;86:75-85.

OCULAR DISORDERS REPORT BLACK RUSSIAN TERRIER

Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
		618		330		0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	0.8%	3	0.9%	0	
22.000	ECTROPION, UNSPECIFIED	4	0.6%	1	0.3%	0	
25.110	DISTICHIASIS	6	1.0%	5	1.5%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.2%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	2	0.3%	4	1.2%	0	
UVEA							
93.110	IRIS HYPOPLASIA	1	0.2%	0	0.0%	0	
93.120	IRIS CYST	3	0.5%	1	0.3%	0	
93.150	IRIS COLOBOMA	1	0.2%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	1.8%	12	3.6%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.2%	1	0.3%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	3	0.9%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	
93.810	UVEAL MELANOMA	0	0.0%	1	0.3%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	4.5%	26	7.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	1.5%	14	4.2%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	7	1.1%	2	0.6%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	1	0.3%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	3	0.9%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	7	2.1%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.6%	8	2.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	9	1.5%	5	1.5%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	1	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	3	0.9%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	6	1.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.6%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.6%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	43	7.0%	49	14.8%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	3	0.9%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.3%	1	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.3%	2	0.6%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.3%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.2%	2	0.6%	0	
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	2	0.6%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	12	1.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	8	1.3%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	1.3%	6	1.8%	0	

OCULAR DISORDERS REPORT BLACK RUSSIAN TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			539	87.2%	252	76.4%	0	

BLOODHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to cornea	Not defined	1	NO
D.	Cataract	Not defined	1	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comment

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BLOODHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 585		2017-2021 85		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			1	0.2%	1	1.2%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			75	12.8%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			130	22.2%	6	7.1%	0	
22.000 ECTROPION, UNSPECIFIED			149	25.5%	13	15.3%	0	
25.110 DISTICHIASIS			9	1.5%	2	2.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.5%	1	1.2%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.2%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			6	1.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			5	0.9%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			3	0.5%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			0	0.0%	1	1.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.3%	1	1.2%	0	
UVEA								
93.120 IRIS CYST			0	0.0%	1	1.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			17	2.9%	7	8.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			5	0.9%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			38	6.5%	2	2.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	0.5%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.2%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			14	2.4%	4	4.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			10	1.7%	1	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.5%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.3%	2	2.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			16	2.7%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			6	1.0%	1	1.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.5%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.7%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			5	0.9%	1	1.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.2%	2	2.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.3%	1	1.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.2%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			57	9.7%	8	9.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.2%	0	0.0%	0	
110.135 PHPV/ PTVL			1	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			33	5.6%	4	4.7%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT BLOODHOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
RETINA Continued								
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.2%	0	0.0%	0	
OPTIC NERVE								
130.150 OPTIC DISC COLOBOMA			1	0.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			5	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			12	2.1%	1	1.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			12	2.1%	4	4.7%	0	
NORMAL								
.000 NORMAL GLOBE			267	45.6%	44	51.8%	0	

BLUE LACY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE LACY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

BLUE LACY

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		4	100.0%	2	100.0%	0	

BLUE MOUNTAIN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE MOUNTAIN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

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BLUETICK COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUETICK COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BLUETICK COONHOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		27		45		0	
			#	%	#	%	#	%
EYELIDS								
22.000 ECTROPION, UNSPECIFIED			1	3.7%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	1	2.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	3.7%	1	2.2%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	3.7%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			2	7.4%	1	2.2%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			0	0.0%	1	2.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	11.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			1	3.7%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	2	4.4%	0	
NORMAL								
.000 NORMAL GLOBE			22	81.5%	40	88.9%	0	

BOERBOEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST
A.	Multifocal retinopathy	Autosomal recessive	2, 3	Breeder option	Mutation in <i>CNGB3</i> gene
B.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT BOERBOEL

Year Examined: Total # Dogs:		1991-2016 36		2017-2021 70		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	2.8%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	0	0.0%	3	4.3%	0	
22.000	ECTROPION, UNSPECIFIED	1	2.8%	0	0.0%	0	
25.110	DISTICHIASIS	3	8.3%	1	1.4%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	1.4%	0	
70.700	CORNEAL DYSTROPHY	0	0.0%	1	1.4%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	1.4%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	2.8%	0	0.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	1.4%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	2	2.9%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	1.4%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	2.8%	1	1.4%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	1.4%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	5.6%	2	2.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.4%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.4%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	2.8%	1	1.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	2.8%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.4%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.4%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	1.4%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	1.4%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	2	5.6%	7	10.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	2.9%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	7	10.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	2.8%	0	0.0%	0	
120.960	RETINOPATHY	0	0.0%	1	1.4%	0	
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	2.8%	5	7.1%	0	
NORMAL							
.000	NORMAL GLOBE	28	77.8%	48	68.6%	0	

BOLOGNESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet.* 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet.* 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT BOLOGNESE

Year Examined: Total # Dogs:		1991-2016 737		2017-2021 104		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.4%	0	0.0%	0	
25.110	DISTICHIASIS	107	14.5%	4	3.8%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.3%	0	0.0%	0	
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.3%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	1	1.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	14	1.9%	2	1.9%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	108	14.7%	20	19.2%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.8%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.5%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	2.4%	2	1.9%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	1.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.3%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	1.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	7	0.9%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	1.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	4	0.5%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	20	2.7%	4	3.8%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	1.0%	0	
110.135	PHPV/ PTVL	0	0.0%	1	1.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.7%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	9	1.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	6	0.8%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	1.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	19	2.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	20	2.7%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	0.9%	2	1.9%	0	
NORMAL							
.000	NORMAL GLOBE	537	72.9%	69	66.3%	0	

BORDER COLLIE

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAMTS17</i> gene
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1	Breeder option	
F.	Lens luxation	Autosomal recessive	1, 3	NO	Mutation in the <i>ADAMTS17</i> gene
G.	Retinal atrophy - generalized	Suggested X- linked	1, 5	NO	
H.	Choroidal hypoplasia (Collie Eye Anomaly) - optic Nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	6-8	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

POAG in the Border Collie is caused by a 19 base pair deletion in exon 2 of *ADAMTS17*. This deletion alters the reading frame and is suspected to cause a truncated protein. The

trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

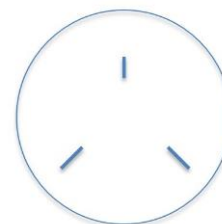
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

H. Choroidal hypoplasia (Collie Eye Anomaly)

- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Foster SJ, Curtis R, Barnett KC. Primary lens luxation in the Border Collie. *J Small Anim Pract.* 1986;27:1-6.
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Veterinary Ophthalmology* 2011;14:378-384.
4. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. *Canine Genet Epidemiol.* 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303
5. Vilboux T, Chaudieu G, Jeannin P, et al. Progressive retinal atrophy in the Border Collie: a new XLPRA. *BMC Vet Res.* 2008;4:10.
6. Bedford PG. Collie eye anomaly in the Border Collie. *Vet Rec.* 1982;111:34-35.
7. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res.* 2007;17:1562-1571.
8. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for collie eye anomaly. *Genomics.* 2003;82:86-95.

OCULAR DISORDERS REPORT BORDER COLLIE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 26,233		2017-2021 2,981		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			13	0.0%	1	0.0%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			2	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			123	0.5%	18	0.6%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	1	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			6	0.0%	1	0.0%	0	
CORNEA								
70.210 PANNUS			19	0.1%	5	0.2%	0	
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			205	0.8%	50	1.7%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.0%	1	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			1	0.0%	2	0.1%	0	
93.120 IRIS CYST			9	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			8	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1,641	6.3%	215	7.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			32	0.1%	7	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			34	0.1%	1	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			15	0.1%	1	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			9	0.0%	14	0.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.0%	3	0.1%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			2	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			2	0.0%	1	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			437	1.7%	36	1.2%	0	
97.120 COLOBOMA			48	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			57	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,241	4.7%	159	5.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			154	0.6%	41	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			78	0.3%	17	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			56	0.2%	16	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			8	0.0%	3	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			201	0.8%	75	2.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			40	0.2%	23	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			56	0.2%	35	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			146	0.6%	13	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			107	0.4%	16	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			126	0.5%	24	0.8%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			14	0.1%	1	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			62	0.2%	27	0.9%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			29	0.1%	13	0.4%	0	

OCULAR DISORDERS REPORT BORDER COLLIE

Year Examined: Total # Dogs:		1991-2016 26,233		2017-2021 2,981		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.317	INCIPIENT CATARACT, CAPSULAR	31	0.1%	6	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.0%	10	0.3%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	7	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	3	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	5	0.2%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	66	0.3%	92	3.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	29	0.1%	1	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	14	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,274	4.9%	430	14.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	67	0.3%	3	0.1%	0	
110.135	PHPV/ PTVL	20	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	15	0.1%	4	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	155	0.6%	23	0.8%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	197	0.8%	17	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	16	0.1%	1	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	228	0.9%	16	0.5%	0	
120.400	RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	0	
120.960	RETINOPATHY	19	0.1%	4	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	21	0.1%	4	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	18	0.1%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	92	0.4%	5	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	214	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	607	2.3%	1	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	251	1.0%	155	5.2%	0	
NORMAL							
.000	NORMAL GLOBE	21,860	83.3%	2,170	72.8%	0	

BORDER TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Y suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

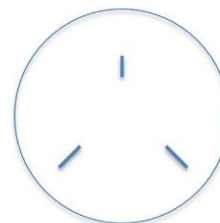
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BORDER TERRIER

Year Examined: Total # Dogs:		1991-2016 6,237		2017-2021 1,600		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.0%	0	0.0%	0	
25.110	DISTICHIASIS	45	0.7%	13	0.8%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	3	0.2%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.1%	0	
70.700	CORNEAL DYSTROPHY	13	0.2%	3	0.2%	0	
UVEA							
93.120	IRIS CYST	1	0.0%	0	0.0%	0	
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	170	2.7%	63	3.9%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.0%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.0%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	1	0.1%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	
97.120	COLOBOMA	1	0.0%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	399	6.4%	128	8.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	71	1.1%	41	2.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	33	0.5%	15	0.9%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	31	0.5%	10	0.6%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.1%	5	0.3%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	75	1.2%	64	4.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	8	0.1%	4	0.3%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	27	0.4%	19	1.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	66	1.1%	24	1.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	55	0.9%	16	1.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	78	1.3%	21	1.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.0%	1	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	16	0.3%	9	0.6%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	14	0.2%	1	0.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.1%	6	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	4	0.1%	7	0.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	5	0.1%	7	0.4%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	3	0.2%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	1	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	50	0.8%	94	5.9%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	20	0.3%	2	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	2	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	

OCULAR DISORDERS REPORT BORDER TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
LENS Continued <i>100.345 SIGNIFICANT CATARACTS (SUMMARY)</i>			587	9.4%	351	21.9%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			6	0.1%	4	0.3%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			14	0.2%	5	0.3%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			53	0.8%	10	0.6%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			13	0.2%	4	0.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			8	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			12	0.2%	1	0.1%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.0%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	5	0.3%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	0.1%	0	
130.120 OPTIC NERVE HYPOPLASIA			1	0.0%	1	0.1%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			56	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			127	2.0%	3	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			65	1.0%	71	4.4%	0	
NORMAL .000 NORMAL GLOBE			5,488	88.0%	1,210	75.6%	0	

BORZOI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Retinopathy	Not defined	1, 2	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinopathy

Patchy focal unilateral or bilateral hyper reflective tapetal lesions most frequently peripheral but occasionally central around a pigmented spot, usually non progressive. Not usually present prior to 3 months of age but usually present by 18 months of age.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Storey ES, Grahn BH and Alcorn J. Multifocal chorioretinal lesions in Borzoi dogs. *Vet Ophthalmol.* 2005 Sep-Oct;8:337-347.

OCULAR DISORDERS REPORT BORZOI

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,491		2017-2021 1,058		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			7	0.2%	1	0.1%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			9	0.3%	2	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	3	0.3%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	3	0.3%	0	
CORNEA								
70.210 PANNUS			17	0.5%	4	0.4%	0	
70.220 PIGMENTARY KERATITIS			0	0.0%	2	0.2%	0	
70.700 CORNEAL DYSTROPHY			16	0.5%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			5	0.1%	3	0.3%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			74	2.1%	14	1.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			11	0.3%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	2	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	1	0.1%	0	
93.810 UVEAL MELANOMA			0	0.0%	5	0.5%	0	
95.120 CILIARY BODY CYST			1	0.0%	1	0.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			110	3.2%	28	2.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			12	0.3%	3	0.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			12	0.3%	3	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	2	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			15	0.4%	3	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.0%	4	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			7	0.2%	16	1.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			13	0.4%	3	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			19	0.5%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			6	0.2%	1	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.1%	1	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			10	0.3%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	2	0.2%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			7	0.2%	3	0.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			8	0.2%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	0.0%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			4	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			124	3.6%	43	4.1%	0	

OCULAR DISORDERS REPORT BORZOI

Year Examined: Total # Dogs:		1991-2016 3,491		2017-2021 1,058		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	13	0.4%	1	0.1%	0	
110.135	PHPV/ PTVL	11	0.3%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	4	0.4%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	8	0.2%	3	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.2%	2	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	3	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	26	0.7%	3	0.3%	0	
120.400	RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.1%	0	0.0%	0	
120.960	RETINOPATHY	26	0.7%	26	2.5%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	12	0.3%	6	0.6%	0	
130.120	OPTIC NERVE HYPOPLASIA	14	0.4%	2	0.2%	0	
130.150	OPTIC DISC COLOBOMA	4	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	44	1.3%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	109	3.1%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	81	2.3%	84	7.9%	0	
NORMAL							
.000	NORMAL GLOBE	3,023	86.6%	872	82.4%	0	

BOSTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
E.	Corneal dystrophy - endothelial	Not defined	1, 4	NO	
F.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
G.	Cataract	Autosomal recessive	1, 5-9	NO	Mutation in the <i>HSF4</i> gene (<i>HSF4-1</i>)
H.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral

E. Corneal dystrophy – endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

In the Boston Terrier, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is not known if this disease is an inherited disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptotically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort, intracorneal bullae with subsequent ulceration and keratoconus may develop.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally during the first three months of life. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Boston Terrier has at least two distinct forms of inherited cataract. One type has an onset before 6 months of age with rapid progression to complete opacity prior to 2 years old. The early onset cataract is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available. A second type of cataract occurs after 4-5 years of age with variable progression. The genetic mutation responsible for this cataract is not yet known.

H. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc.* 1986;188:1028-1030.
3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol.* 2004;7:97-111.
4. Martin CL, Dice PF. Corneal Endothelial Dystrophy in the Dog. *J Am Anim Hosp Assoc.* 1982;18:327-336.
5. Curtis R. Late-onset cataract in the Boston terrier. *Vet Rec.* 1984;115:577-578.
6. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract.* 1985;26:305-316.
7. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract.* 1978;19:109-120.
8. Mellersh CS, Graves KT, McLaughlin B, et al. Mutation in HSF4 associated with early but not late-onset hereditary cataract in the Boston Terrier. *J Hered.* 2007;98:531-533.
9. Mellersh CS, Pettitt L, Forman OP, et al. Identification of mutations in HSF4 in dogs of three different breeds with hereditary cataracts. *Vet Ophthalmol.* 2006;9:369-378.

OCULAR DISORDERS REPORT BOSTON TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 14,200		2017-2021 4,070		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.0%	3	0.1%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			5	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			12	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			44	0.3%	14	0.3%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			498	3.5%	111	2.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			35	0.2%	93	2.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			13	0.1%	1	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	2	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			9	0.1%	5	0.1%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			20	0.1%	7	0.2%	0	
70.700 CORNEAL DYSTROPHY			334	2.4%	87	2.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			27	0.2%	3	0.1%	0	
UVEA								
93.110 IRIS HYPOPLASIA			6	0.0%	2	0.0%	0	
93.120 IRIS CYST			24	0.2%	2	0.0%	0	
93.150 IRIS COLOBOMA			8	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			5	0.0%	4	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			526	3.7%	163	4.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			12	0.1%	4	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			7	0.0%	2	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	2	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			3	0.0%	7	0.2%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	3	0.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			81	0.6%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			327	2.3%	79	1.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			200	1.4%	55	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			50	0.4%	19	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			85	0.6%	25	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			43	0.3%	18	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			30	0.2%	9	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			15	0.1%	4	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			37	0.3%	28	0.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			660	4.6%	140	3.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			157	1.1%	33	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			300	2.1%	48	1.2%	0	

OCULAR DISORDERS REPORT BOSTON TERRIER

Year Examined: Total # Dogs:		1991-2016 14,200		2017-2021 4,070		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	87	0.6%	12	0.3%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	36	0.3%	4	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	19	0.1%	5	0.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	19	0.1%	2	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	38	0.3%	53	1.3%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	15	0.1%	21	0.5%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	19	0.1%	10	0.2%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	3	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	13	0.1%	5	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	96	0.7%	7	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	15	0.1%	3	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	2,006	14.1%	502	12.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	48	0.3%	28	0.7%	0	
110.135	PHPV/ PTVL	9	0.1%	4	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	44	0.3%	5	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	146	1.0%	25	0.6%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	35	0.2%	6	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	12	0.1%	5	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.1%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	0	0.0%	0	
120.960	RETINOPATHY	3	0.0%	3	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	0	0.0%	1	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	165	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	380	2.7%	6	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	216	1.5%	212	5.2%	0	
NORMAL							
.000	NORMAL GLOBE	11,425	80.5%	3,095	76.0%	0	

BOUVIER DES FLANDRES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Uveal cysts	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Persistent hyperplastic primary vitreous/Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Not defined	1, 4	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

In this breed, primary glaucoma is associated with narrowed iridocorneal angles and various degrees of congenital angle malformations varying from mild to severe. Dysplastic pectinate ligaments and subsequent narrowed angles are similar to those described in the Basset Hound and American and English Cocker Spaniels. The occurrence of glaucoma is related to the most severe abnormalities of the pectinate ligaments. The relationship between glaucoma development and the anomaly of the pectinate ligament is not clear.

A recent study evaluated risk factors for development of glaucoma in the Bouvier des Flandres. A narrow angle with dysplastic pectinate ligaments on gonioscopy and/or presence of a narrow or closed ciliary cleft on high resolution ultrasound were associated with development of primary glaucoma in the breed.

B. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

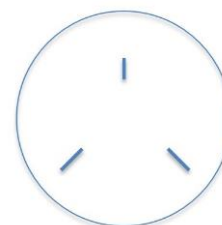
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by

drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

In the Bouvier des Flandres, the condition is associated with retinal dysplasia and detachment, optic nerve hypoplasia, lenticonus, cataract and congenital blindness.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. van der Linde-Sipman JS. Dysplasia of the pectinate ligament and primary glaucoma in the Bouvier des Flandres dog. *Vet Pathol.* 1987;24:201-206.
3. Dubin AJ, Bentley E, Buhr KA, et al. Evaluation of potential risk factors for primary angle-closure glaucoma in Bouvier des Flandres. *J Am Vet Med Assoc.* 2017;250: 60-67.
4. Van Rensburg IBJ, Petrick S, Van der Lagt J, et al. Multiple inherited eye anomalies including persistent hyperplastic tunica vasculosa lentis in the Bouvier des Flanders. *Prog Vet Comp Ophthalmol.* 1992;2: 193

OCULAR DISORDERS REPORT BOUVIER DES FLANDRES

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,207		2017-2021 809		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.0%	1	0.1%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			29	0.6%	5	0.6%	0	
22.000 ECTROPION, UNSPECIFIED			6	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			45	0.9%	3	0.4%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			33	0.6%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			14	0.3%	4	0.5%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	1	0.1%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			0	0.0%	2	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			434	8.3%	82	10.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.1%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			19	0.4%	12	1.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			5	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			440	8.5%	92	11.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			61	1.2%	32	4.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			45	0.9%	6	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.1%	3	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			10	0.2%	5	0.6%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			61	1.2%	23	2.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			19	0.4%	12	1.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			31	0.6%	22	2.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			19	0.4%	7	0.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			104	2.0%	14	1.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			22	0.4%	4	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			24	0.5%	6	0.7%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			35	0.7%	7	0.9%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			15	0.3%	8	1.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.1%	5	0.6%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			4	0.1%	3	0.4%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.0%	2	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			32	0.6%	55	6.8%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			31	0.6%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			527	10.1%	216	26.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			8	0.2%	7	0.9%	0	

OCULAR DISORDERS REPORT BOUVIER DES FLANDRES

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	5,207		809		0	
		#	%	#	%	#	%
VITREOUS Continued							
110.135 PHPV/ PTVL		6	0.1%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	0.0%	1	0.1%	0	
110.320 VITREOUS DEGENERATION SYNERESIS		10	0.2%	2	0.2%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		35	0.7%	1	0.1%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		3	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		14	0.3%	0	0.0%	0	
120.960 RETINOPATHY		0	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		2	0.0%	1	0.1%	0	
130.120 OPTIC NERVE HYPOPLASIA		1	0.0%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA		3	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		64	1.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		136	2.6%	2	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		153	2.9%	44	5.4%	0	
NORMAL							
.000 NORMAL GLOBE		4,032	77.4%	525	64.9%	0	

BOXER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Ectropion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Corneal dystrophy - epithelial erosion	Not defined	1-4	Breeder option
E.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Boxer, because there is significant clinical disease associated with the abnormal hairs, breeding affected animals should be discouraged.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Corneal dystrophy - epithelial erosion

A general group of corneal ulcerative conditions (e.g. erosions, indolent or persistent ulcers, epithelial bonding defects) is recognized as a common problem in older Boxers (as well as other older animals). It has been commonly referred to as Boxer corneal ulceration. Animals

that are affected are usually 7-8 years of age or older. The ulceration can be a very difficult lesion to heal, and it is often recurrent. The chronic form stimulates eventual scarring, with vascularization, fibrosis and pigmentation of the lesion site. The lesion can cause vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Roberts SR. Superficial indolent ulcer in the cornea of Boxer dogs. *J Small Anim Pract.* 1965;6:111.
3. Gelatt KN and Samuelson DA. Recurrent corneal erosions and epithelial dystrophy in the Boxer dog. *J Am Anim Hosp Assoc.* 1982;18:453.
4. Kirschner SE, Niyo Y and Betts DM. Idiopathic persistent corneal erosions: clinical and pathological findings in 18 dogs. *J Am Anim Hosp Assoc.* 1989;25:84.

OCULAR DISORDERS REPORT BOXER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,775		2017-2021 186		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			5	0.3%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			3	0.2%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			9	0.5%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			7	0.4%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			68	3.8%	3	1.6%	0	
25.110 DISTICHIASIS			209	11.8%	24	12.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			147	8.3%	16	8.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.2%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			1	0.1%	1	0.5%	0	
93.150 IRIS COLOBOMA			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			4	0.2%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.2%	1	0.5%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			11	0.6%	2	1.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	0.2%	3	1.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.2%	2	1.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			44	2.5%	9	4.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	0.2%	1	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.2%	1	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.2%	1	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	1	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.2%	2	1.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			16	0.9%	7	3.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			2	0.1%	1	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			7	0.4%	1	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.1%	3	1.6%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	1	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.1%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.2%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.4%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			69	3.9%	19	10.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT BOXER

Year Examined: Total # Dogs:		1991-2016 1,775		2017-2021 186		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	11	0.6%	1	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	0.3%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	2	1.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.2%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	3	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	13	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	44	2.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	24	1.4%	13	7.0%	0	
NORMAL							
.000	NORMAL GLOBE	1,298	73.1%	120	64.5%	0	

BOYKIN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 2	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Choroidal hypoplasia (Collie Eye Anomaly)

- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee, 1999 and/or Data from OFA All-Breeds Report, 1991-1998.
2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res.* 2007 Nov;17:1562-1571.

OCULAR DISORDERS REPORT BOYKIN SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,734		2017-2021 1,763		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	1	0.1%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			2	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			1	0.0%	1	0.1%	0	
25.110 DISTICHIASIS			479	12.8%	264	15.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	3	0.2%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	1	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			53	1.4%	22	1.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			3	0.1%	3	0.2%	0	
93.120 IRIS CYST			1	0.0%	1	0.1%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			103	2.8%	36	2.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.1%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			12	0.3%	32	1.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	2	0.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			2	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			52	1.4%	6	0.3%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			7	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			199	5.3%	166	9.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			27	0.7%	85	4.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			48	1.3%	20	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			8	0.2%	3	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			10	0.3%	3	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			23	0.6%	21	1.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			17	0.5%	40	2.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			25	0.7%	54	3.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			17	0.5%	12	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			45	1.2%	41	2.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			7	0.2%	5	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.2%	5	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			11	0.3%	9	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			11	0.3%	19	1.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.2%	0	

OCULAR DISORDERS REPORT BOYKIN SPANIEL

Year Examined: Total # Dogs:		1991-2016 3,734		2017-2021 1,763		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	4	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.1%	2	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	2	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	10	0.3%	20	1.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	10	0.3%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	285	7.6%	351	19.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	38	1.0%	33	1.9%	0	
110.135	PHPV/ PTVL	3	0.1%	4	0.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	7	0.2%	4	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	67	1.8%	15	0.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	9	0.2%	3	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	30	0.8%	3	0.2%	0	
120.400	RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	2	0.1%	0	
120.960	RETINOPATHY	14	0.4%	4	0.2%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	29	0.8%	12	0.7%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	73	2.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	82	2.2%	8	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	59	1.6%	113	6.4%	0	
NORMAL							
.000	NORMAL GLOBE	2,812	75.3%	1,092	61.9%	0	

BOZ SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BOZ SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

BOZ SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

BRACCO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BRACCO ITALIANO

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	132		91		0	
			#	%	#	%	#	%
EYELIDS								
20.160	MACROPALPEBRAL FISSURE		1	0.8%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED		6	4.5%	8	8.8%	0	
25.110	DISTICHIASIS		10	7.6%	10	11.0%	0	
NICTITANS								
51.100	THIRD EYELID CARTILAGE ANOMALY		2	1.5%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID		1	0.8%	0	0.0%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		2	1.5%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	2	2.2%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		10	7.6%	5	5.5%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		3	2.3%	0	0.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		4	3.0%	1	1.1%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.8%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		2	1.5%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		0	0.0%	2	2.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		1	0.8%	2	2.2%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		8	6.1%	1	1.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		4	3.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		0	0.0%	1	1.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		2	1.5%	1	1.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		2	1.5%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES		2	1.5%	2	2.2%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		29	22.0%	10	11.0%	0	
VITREOUS								
110.135	PHPV/ PTVL		2	1.5%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		0	0.0%	2	2.2%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		8	6.1%	2	2.2%	0	
120.960	RETINOPATHY		2	1.5%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		2	1.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		3	2.3%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	1.5%	4	4.4%	0	
NORMAL								
.000	NORMAL GLOBE		85	64.4%	59	64.8%	0	

BRAQUE D'Auvergne

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE D'Auvergne breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BRAQUE D'AUVERGNE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 28		2017-2021 20		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	3.6%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	1	5.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	7.1%	4	20.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	3.6%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	3.6%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	14.3%	3	15.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			2	7.1%	1	5.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	5.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	7.1%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	3.6%	1	5.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	5.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	7.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			7	25.0%	4	20.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	3.6%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			1	3.6%	0	0.0%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	3.6%	5	25.0%	0	
NORMAL								
.000 NORMAL GLOBE			18	64.3%	9	45.0%	0	

BRAQUE DU BOURBONNAIS

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE DU BOURBONNAIS breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

BRAQUE DU BOURBONNAIS

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			6	100.0%	1	100.0%	0	

BRAQUE FRANCAIS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BRAQUE FRANCAIS

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	43		68		0	
			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		2	4.7%	2	2.9%	0	
UVEA								
93.120	IRIS CYST		0	0.0%	1	1.5%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	1	1.5%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	3	4.4%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		5	11.6%	3	4.4%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	2.3%	2	2.9%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		1	2.3%	2	2.9%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		0	0.0%	1	1.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		1	2.3%	1	1.5%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		2	4.7%	1	1.5%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	2	2.9%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	1.5%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS		0	0.0%	2	2.9%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		5	11.6%	12	17.6%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		0	0.0%	1	1.5%	0	
OTHER								
900.100	OTHER, NOT INHERITED		0	0.0%	2	2.9%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		4	9.3%	5	7.4%	0	
NORMAL								
.000	NORMAL GLOBE		34	79.1%	47	69.1%	0	

BRAQUE FRANCAIS PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE FRANCAIS PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

BRAQUE FRANCAIS PYRENEES

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	2	11.8%	0	
LENS 100.316 INCIPIENT CATARACT, NUCLEUS 100.345 SIGNIFICANT CATARACTS (SUMMARY)		0 0	0.0% 0.0%	1 1	5.9% 5.9%	0 0	
VITREOUS 110.120 PERSISTENT HYALOID ARTERY/ REMNANT		0	0.0%	1	5.9%	0	
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	5.9%	0	
NORMAL .000 NORMAL GLOBE		3	75.0%	13	76.5%	0	

BRAZILIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Multifocal retinopathy	Autosomal recessive	1-3	Breeder option	Mutation in the <i>CNGB3</i> gene

Description and Comments

A. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Brazilian Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of *CNGB3* is identical by descent in multiple canine breeds and causes achromatopsia. *BMC Genet.* 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474
2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One.* 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One.* 2016

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Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650; PMCID: PMC4985128.

OCULAR DISORDERS REPORT BRAZILIAN TERRIER

There are no statistics available for this breed

BRIARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Passes with no notation	
	- lens pigment foci/no strands				
C.	Cataract	Not defined	1	NO	
D.	Retinal dystrophy formerly Congenital stationary night blindness (CSNB)	Autosomal recessive	1-3	NO	Mutation in the <i>RPE65</i> gene

Description and Comments

A. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal dystrophy formerly Congenital stationary night blindness (*CSNB*)

A non-progressive retinal function defect characterized primarily by night blindness; day vision is normal to severely compromised. CSNB is an autosomal recessive trait caused by a mutation in the RPE65 gene. The condition is detected by 5-6 weeks of age, after the postnatal maturation of the retina is completed. Nystagmus is present in some dogs, particularly in those having night blindness and severely compromised day vision. Ophthalmoscopic examination shows no abnormalities. Abnormalities in serum lipids (mild hypercholesterolemia) and elevated arachidonic acid have been noted in some animals. The ERG results are specific and diagnostic for the disorder. ERG testing is essential to distinguish this disorder from more central visual pathway defects which may appear clinically similar.

The gene mutation RPE65 has been identified. This is the same mutation as causes Leber's congenital amaurosis, also sometimes called juvenile retinitis pigmentosa (RP), in humans. A DNA test is available.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Das, R. G., et al. (2019). "Genome-wide association study and whole-genome sequencing identify a deletion in LRIT3 associated with canine congenital stationary night blindness." Sci Rep 9(1): 14166. PMID: 31578364
3. Veske A, Nilsson SE, Narfström K, Gal A. Retinal dystrophy of Swedish briard/briard-beagle dogs is due to a 4-bp deletion in RPE65. *Genomics*. 1999 Apr 1;57(1):57-61. doi: 10.1006/geno.1999.5754. PMID: 10191083.

OCULAR DISORDERS REPORT BRIARD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,277		2017-2021 207		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			9	0.4%	3	1.4%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.1%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.1%	1	0.5%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			31	1.4%	7	3.4%	0	
UVEA								
93.120 IRIS CYST			10	0.4%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			23	1.0%	8	3.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	1	0.5%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			9	0.4%	6	2.9%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			73	3.2%	9	4.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	0.4%	1	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.1%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	1	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.2%	3	1.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.3%	1	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			4	0.2%	8	3.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			6	0.3%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	0.4%	1	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.3%	1	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.1%	2	1.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	2	1.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			69	3.0%	20	9.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.0%	0	0.0%	0	
110.135 PHPV/ PTVL			3	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.1%	1	0.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			7	0.3%	0	0.0%	0	

OCULAR DISORDERS REPORT BRIARD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,277		207		0	
			#	%	#	%	#	%
RETINA Continued								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		1	0.0%	1	0.5%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		1	0.0%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE		1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		2	0.1%	0	0.0%	0	
OPTIC NERVE								
130.120	OPTIC NERVE HYPOPLASIA		1	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA		3	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		37	1.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		58	2.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		33	1.4%	11	5.3%	0	
NORMAL								
.000	NORMAL GLOBE		2,083	91.5%	165	79.7%	0	

BRITTANY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membrane			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The exact frequency and significance of cataracts in the Brittany is not known, although it is probably low.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT BRITTANY

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	2,420		878		0	
			#	%	#	%	#	%
EYELIDS								
21.000	ENTROPION, UNSPECIFIED		0	0.0%	1	0.1%	0	
25.110	DISTICHIASIS		58	2.4%	12	1.4%	0	
NASOLACRIMAL								
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM		0	0.0%	1	0.1%	0	
40.910	KERATOCONJUNCTIVITIS SICCA		1	0.0%	0	0.0%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		2	0.1%	0	0.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		5	0.2%	2	0.2%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		3	0.1%	0	0.0%	0	
UVEA								
93.120	IRIS CYST		1	0.0%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST		0	0.0%	1	0.1%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		38	1.6%	12	1.4%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		2	0.1%	1	0.1%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		11	0.5%	20	2.3%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		10	0.4%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		108	4.5%	39	4.4%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		23	1.0%	14	1.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		32	1.3%	13	1.5%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		6	0.2%	1	0.1%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.0%	2	0.2%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		9	0.4%	5	0.6%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		7	0.3%	7	0.8%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		14	0.6%	11	1.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		12	0.5%	7	0.8%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		39	1.6%	18	2.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		13	0.5%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		2	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		9	0.4%	3	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		8	0.3%	2	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		6	0.2%	3	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		1	0.0%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		1	0.0%	0	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		1	0.0%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR		1	0.0%	3	0.3%	0	
100.328	Y-SUTURE TIP OPACITIES		2	0.1%	4	0.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		4	0.2%	0	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT		1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		3	0.1%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		202	8.3%	93	10.6%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		5	0.2%	5	0.6%	0	
110.135	PHPV/ PTVL		1	0.0%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	0.0%	3	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		14	0.6%	5	0.6%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		7	0.3%	3	0.3%	0	

OCULAR DISORDERS REPORT BRITTANY

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 2,420		2017-2021 878		2021 0	
		#	%	#	%	#	%
RETINA Continued							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	6	0.2%	3	0.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	21	0.9%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	2	0.1%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	17	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	61	2.5%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.0%	48	5.5%	0	
NORMAL							
.000	NORMAL GLOBE	2,082	86.0%	700	79.7%	0	

BRUSSELS GRIFFON

	DISORDER	INHERITANCE	REFERENCES	BREEDING ADVICE	Genetic Test Available
A.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	1	NO	
F.	Vitreous degeneration	Not defined	1, 2	Breeder option	
G.	Retinal atrophy - generalized	Not defined	3	NO	Mutation in the <i>prcd</i> gene
H.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded;

breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness.

F. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Krishnan, H., et al. (2020). "Vitreous degeneration and associated ocular abnormalities in the dog." Vet Ophthalmol 23(2): 219-224. PMID: 31464365.
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT BRUSSELS GRIFFON

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,430		388		0	
			#	%	#	%	#	%
EYELIDS								
20.140	ECTOPIC CILIA		8	0.6%	2	0.5%	0	
21.000	ENTROPION, UNSPECIFIED		6	0.4%	0	0.0%	0	
25.110	DISTICHIASIS		32	2.2%	10	2.6%	0	
NASOLACRIMAL								
40.910	KERATOCONJUNCTIVITIS SICCA		3	0.2%	0	0.0%	0	
CORNEA								
70.210	PANNUS		1	0.1%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS		24	1.7%	6	1.5%	0	
70.700	CORNEAL DYSTROPHY		10	0.7%	3	0.8%	0	
UVEA								
93.110	IRIS HYPOPLASIA		2	0.1%	0	0.0%	0	
93.120	IRIS CYST		2	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		130	9.1%	42	10.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		1	0.1%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		2	0.1%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS		1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		11	0.8%	10	2.6%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		4	0.3%	1	0.3%	0	
97.150	CHORIORETINAL COLOBOMA, CONGENITAL		1	0.1%	1	0.3%	0	
FUNDUS								
97.110	CHOROIDAL HYPOPLASIA		2	0.1%	0	0.0%	0	
97.120	COLOBOMA		2	0.1%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		8	0.6%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		56	3.9%	7	1.8%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		33	2.3%	4	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		11	0.8%	1	0.3%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		5	0.3%	2	0.5%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		3	0.2%	1	0.3%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		1	0.1%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		1	0.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		4	0.3%	1	0.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		82	5.7%	10	2.6%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		35	2.4%	5	1.3%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		44	3.1%	4	1.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		7	0.5%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		5	0.3%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		5	0.3%	1	0.3%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		2	0.1%	3	0.8%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		2	0.1%	4	1.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	2	0.5%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR		0	0.0%	1	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		29	2.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		8	0.6%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		277	19.4%	40	10.3%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		10	0.7%	1	0.3%	0	
110.135	PHPV/ PTVL		2	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BRUSSELS GRIFFON

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,430		388		0	
			#	%	#	%	#	%
VITREOUS Continued								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			89	6.2%	11	2.8%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			253	17.7%	24	6.2%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			26	1.8%	9	2.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			13	0.9%	5	1.3%	0	
120.190 RETINAL DYSPLASIA, DETACHED			2	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			23	1.6%	2	0.5%	0	
120.400 RETINAL HEMORRHAGE			2	0.1%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			2	0.1%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	1	0.3%	0	
OPTIC NERVE								
130.120 OPTIC NERVE HYPOPLASIA			3	0.2%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			19	1.3%	2	0.5%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			26	1.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			29	2.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			22	1.5%	21	5.4%	0	
NORMAL								
.000 NORMAL GLOBE			855	59.8%	262	67.5%	0	

BULL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BULL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT BULL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 247		2017-2021 17		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			3	1.2%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			2	0.8%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.4%	0	0.0%	0	
25.110 DISTICHIASIS			5	2.0%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			1	0.4%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			5	2.0%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			8	3.2%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	1.6%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			12	4.9%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.4%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.4%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			6	2.4%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	1.2%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.8%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.8%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.4%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.4%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.4%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			3	1.2%	1	5.9%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.4%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.4%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	1.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			7	2.8%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			20	8.1%	1	5.9%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	0.4%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			4	1.6%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.4%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			0	0.0%	1	5.9%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.4%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			2	0.8%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			3	1.2%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA			3	1.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			5	2.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			8	3.2%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	1.2%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			194	78.5%	15	88.2%	0	

BULLDOG

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 5	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Ectopic cilia	Not defined	1	Breeder option	
F.	Prolapsed gland of third eyelid	Not defined	1, 2-4	Breeder option	
G.	Exposure/Pigmentary Keratitis	Not defined	1	Breeder option	
H.	Secondary keratitis - chronic	Not defined	1	Passes with no notation	
I.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
J.	Cataract	Not defined	1	NO	
K.	Retinal dysplasia - folds	Not defined	1	Breeder option	
L.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	6, 7	Breeder option	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bulldog, ectropion is associated with an exceptionally large palpebral fissure and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid. This causes severe ocular irritation.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Bulldog, these abnormal eyelashes may be associated with significant clinical disease and breeding of affected animals should be discouraged.

E. Ectopic cilia

Hair emerging through the eyelid conjunctiva. Ectopic cilia occur more frequently in younger dogs and cause discomfort and corneal disease.

F. Prolapse of the gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

Bulldogs were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 100% of the prolapsed glands in Bulldogs occurred before 1 year of age. Bulldogs were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

G. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the

globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

K. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

L. Multifocal Retinopathy

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write multifocal retinopathy.

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog. The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal

thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

References

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3. Morgan RV, Duddy JM, McClurg K. Prolapse of the gland of the third eyelid in the dog: A retrospective study of 89 cases (1980-1990). *J Am Anim Hosp Assoc.* 1993;29:56.
4. Mazzucchelli S, Vaillant MD, Weverberg F, et al. Retrospective study of 155 cases of prolapse of the nictitating membrane gland in dogs. *Vet Rec.* 2012;170:443.
5. Kaswan RL, Martin CL, Chapman WL, Jr. Keratoconjunctivitis sicca: histopathologic study of nictitating membrane and lacrimal glands from 28 dogs. *Am J Vet Res.* 1984;45:112-118.
6. Guziewicz KE, Slavik J, Lindauer SP et al. Molecular consequences of BEST1 gene mutations in canine multifocal retinopathy predict functional implications for human bestrophinopathies. *IOVS* 52(7) 2011; 4497-505.
7. Donner J, Kaukonen M, Anderson H et al. Genetic panel screening of nearly 100 mutations reveals new insights into the breed distribution of risk variants for canine hereditary disorders. *PLOS One* Aug 2016 11 (8): 1-18.

OCULAR DISORDERS REPORT BULLDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,265		2017-2021 382		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	1	0.3%	0	
EYELIDS								
20.140 ECTOPIC CILIA			9	0.7%	5	1.3%	0	
20.160 MACROPALPEBRAL FISSURE			16	1.3%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			183	14.5%	61	16.0%	0	
22.000 ECTROPION, UNSPECIFIED			66	5.2%	12	3.1%	0	
25.110 DISTICHIASIS			287	22.7%	92	24.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			4	0.3%	2	0.5%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			8	0.6%	4	1.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			20	1.6%	3	0.8%	0	
CORNEA								
70.210 PANNUS			9	0.7%	4	1.0%	0	
70.220 PIGMENTARY KERATITIS			26	2.1%	7	1.8%	0	
70.700 CORNEAL DYSTROPHY			11	0.9%	4	1.0%	0	
UVEA								
93.120 IRIS CYST			8	0.6%	2	0.5%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.1%	1	0.3%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			8	0.6%	6	1.6%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.2%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			2	0.2%	1	0.3%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			34	2.7%	2	0.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			6	0.5%	2	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.2%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.1%	1	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			6	0.5%	1	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.2%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	0.4%	1	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			2	0.2%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			3	0.2%	1	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.2%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.3%	0	
100.328 Y-SUTURE TIP OPACITIES			5	0.4%	2	0.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.4%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			45	3.6%	10	2.6%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			75	5.9%	18	4.7%	0	

OCULAR DISORDERS REPORT BULLDOG

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	1,265		382		0	
		#	%	#	%	#	%
RETINA Continued							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	2	0.5%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.2%	0	0.0%	0	
120.960	RETINOPATHY	1	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.3%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	7	0.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	40	3.2%	1	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	48	3.8%	30	7.9%	0	
NORMAL							
.000	NORMAL GLOBE	725	57.3%	194	50.8%	0	

BULLMASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (<i>RHO</i>)	Autosomal dominant	2	NO	Mutation in the <i>RHO</i> gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	
H.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	3	Breeder option	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bullmastiff, the palpebral fissures may become vertical and/or shaped like a "pagoda." Entropion in the Bullmastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion (rolling-out) of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA in the Bullmastiff is inherited as an autosomal dominant trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Kijas JW, Cideciyan AV, Aleman TS, et al. Naturally occurring rhodopsin mutation in the dog causes retinal dysfunction and degeneration mimicking human dominant retinitis pigmentosa. *Proc Natl Acad Sci U S A*. 2002 Apr 30;99:6328-6333.
3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007 May;48:1959-1967.

OCULAR DISORDERS REPORT BULLMASTIFF

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,758		2017-2021 697		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			5	0.3%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			16	0.9%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			101	5.7%	48	6.9%	0	
22.000 ECTROPION, UNSPECIFIED			28	1.6%	7	1.0%	0	
25.110 DISTICHIASIS			49	2.8%	10	1.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	1	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.1%	2	0.3%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.2%	4	0.6%	0	
70.700 CORNEAL DYSTROPHY			2	0.1%	3	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			9	0.5%	3	0.4%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			3	0.2%	1	0.1%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	3	0.4%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			66	3.8%	34	4.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			10	0.6%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			23	1.3%	5	0.7%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.4%	1	0.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.2%	5	0.7%	0	
95.120 CILIARY BODY CYST			1	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			56	3.2%	14	2.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			9	0.5%	6	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	0.2%	2	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	4	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.2%	1	0.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			11	0.6%	5	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			13	0.7%	4	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			10	0.6%	4	0.6%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.2%	3	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.1%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			4	0.2%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT BULLMASTIFF

Year Examined: Total # Dogs:		1991-2016 1,758		2017-2021 697		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	4	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.4%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	84	4.8%	36	5.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	0.3%	0	
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	78	4.4%	44	6.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.2%	0	0.0%	0	
120.960	RETINOPATHY	6	0.3%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	7	0.4%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	6	0.3%	2	0.3%	0	
130.150	OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	25	1.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	42	2.4%	5	0.7%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	1.3%	24	3.4%	0	
NORMAL							
.000	NORMAL GLOBE	1,342	76.3%	505	72.5%	0	

CA DE BOU

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CA DE BOU breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CA DE BOU

There are no statistics available for this breed

CAIRN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ocular melanosis with and without glaucoma	Presumed autosomal dominant	1, 2	NO
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
C.	Cataract	Not defined	1	NO
D.	Vitreous degeneration	Not defined	1	Breeder option
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

- A. Ocular melanosis with and without glaucoma
(Previously ocular melanosis with secondary glaucoma, previously pigmentary glaucoma)

A proliferation of melanocytes within the uveal tract associated with an elevation in intraocular pressure. Obstruction of the aqueous outflow pathways occurs resulting in glaucoma. This condition has been identified most commonly in the Cairn Terrier. The condition is familial but the exact mode of inheritance is unknown (pedigree analysis has ruled out a sex-linked disorder). In the Cairn Terrier, the disease is very slowly progressive and blindness ultimately results. Some dogs develop episodes of anterior uveitis associated with the shedding of large amounts of pigment from the iris surface. There is a long pre-glaucomatous phase of the disease in which diagnosis of the condition is possible. Age of onset varies from 2-14 years.

- B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Petersen-Jones SM, Forcier J, Mentzer AL. Ocular melanosis in the Cairn Terrier: clinical description and investigation of mode of inheritance. *Vet Ophthalmol.* 2007;10 Suppl 1:63-69.

OCULAR DISORDERS REPORT CAIRN TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,043		2017-2021 740		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.0%	0	0.0%	0	
10.000 GLAUCOMA			3	0.1%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			14	0.3%	7	0.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	2	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			8	0.2%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	1	0.1%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			7	0.2%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			25	0.6%	4	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.1%	0	0.0%	0	
UVEA								
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	1	0.1%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			344	8.5%	138	18.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.3%	4	0.5%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			31	0.8%	26	3.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			9	0.2%	7	0.9%	0	
93.810 UVEAL MELANOMA			0	0.0%	2	0.3%	0	
93.930 OCULAR MELANOCYTOSIS			9	0.2%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			11	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			238	5.9%	52	7.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			57	1.4%	33	4.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			43	1.1%	9	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			34	0.8%	11	1.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			10	0.2%	3	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.1%	4	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			16	0.4%	14	1.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			39	1.0%	7	0.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			65	1.6%	12	1.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			32	0.8%	5	0.7%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			10	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			5	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.1%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			13	0.3%	0	0.0%	0	

OCULAR DISORDERS REPORT CAIRN TERRIER

Year Examined: Total # Dogs:		1991-2016 4,043		2017-2021 740		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	12	0.3%	5	0.7%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.1%	1	0.1%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	1	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	37	0.9%	2	0.3%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	2	0.0%	2	0.3%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	403	10.0%	113	15.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	40	1.0%	15	2.0%	0	
110.135	PHPV/ PTVL	6	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	45	1.1%	13	1.8%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	21	0.5%	3	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	2	0.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	22	0.5%	1	0.1%	0	
120.960	RETINOPATHY	1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	8	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	11	0.3%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	76	1.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	127	3.1%	4	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	126	3.1%	32	4.3%	0	
NORMAL							
.000	NORMAL GLOBE	3,115	77.0%	444	60.0%	0	

CANAAN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
B.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT CANAAN DOG

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	534		76		0	
			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		15	2.8%	1	1.3%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		4	0.7%	0	0.0%	0	
UVEA								
93.120	IRIS CYST		1	0.2%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST		1	0.2%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		21	3.9%	2	2.6%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS		1	0.2%	0	0.0%	0	
FUNDUS								
97.110	CHOROIDAL HYPOPLASIA		1	0.2%	1	1.3%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		20	3.7%	5	6.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		2	0.4%	1	1.3%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		2	0.4%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		1	0.2%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.2%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		4	0.7%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		1	0.2%	1	1.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		3	0.6%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		7	1.3%	2	2.6%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		1	0.2%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		1	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		12	2.2%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		1	0.2%	0	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		1	0.2%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES		1	0.2%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		13	2.4%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		51	9.6%	4	5.3%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		1	0.2%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		2	0.4%	1	1.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		9	1.7%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		6	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		18	3.4%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		5	0.9%	3	3.9%	0	
NORMAL								
.000	NORMAL GLOBE		435	81.5%	65	85.5%	0	

CANADIAN ESKIMO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT CANADIAN ESKIMO DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
CORNEA								
70.700 CORNEAL DYSTROPHY			1	3.8%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			6	23.1%	3	13.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	4.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	4.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	3.8%	1	4.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	3.8%	2	8.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	3.8%	0	0.0%	0	
RETINA								
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	3.8%	0	0.0%	0	
OTHER								
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	7.7%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			19	73.1%	18	78.3%	0	

CANE CORSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breed Report.

OCULAR DISORDERS REPORT CANE CORSO

Year Examined: Total # Dogs:		1991-2016 150		2017-2021 164		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	4	2.7%	2	1.2%	0	
22.000	ECTROPION, UNSPECIFIED	10	6.7%	5	3.0%	0	
25.110	DISTICHIASIS	6	4.0%	12	7.3%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.7%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	1.3%	2	1.2%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.7%	0	0.0%	0	
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.6%	0	
93.120	IRIS CYST	1	0.7%	1	0.6%	0	
93.170	ANTERIOR CHAMBER CYST	1	0.7%	1	0.6%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	2.0%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	0.6%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	1.3%	2	1.2%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	2.7%	7	4.3%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.7%	3	1.8%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	1.3%	1	0.6%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.7%	2	1.2%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.7%	1	0.6%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	3	1.8%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.6%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.7%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.7%	1	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.7%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	1	0.6%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8	5.3%	12	7.3%	0	
VITREOUS							
110.135	PHPV/ PTVL	1	0.7%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.6%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.7%	1	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.6%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	1	0.6%	0	
120.960	RETINOPATHY	1	0.7%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	0	0.0%	1	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.7%	6	3.7%	0	
NORMAL							
.000	NORMAL GLOBE	120	80.0%	127	77.4%	0	

CAO DE CASTRO LABOREIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAO DE CASTRO LABOREIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

CAO DE CASTRO LABOREIRO

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

CARDIGAN WELSH CORGI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 3 (<i>rcd3</i>)	Presumed autosomal recessive	2-4	NO	Mutation in the <i>PDE6A</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin that may cause ocular irritation. Distichiasis may occur any time in the life of the dog. It is difficult to make a strong recommendation about breeding dogs with this entity. The hereditary basis is not known although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

D. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Cardigan Welsh Corgi is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (*rcd3*). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Petersen-Jones SM, Entz DD, Sargan DR. cGMP phosphodiesterase-alpha mutation causes progressive retinal atrophy in the Cardigan Welsh Corgi dog. *Invest Ophthalmol Vis Sci*. 1999;40:1637-1644.
3. Petersen-Jones SM, Entz DD. An improved DNA-based test for detection of the codon 616 mutation in the alpha cyclic GMP phosphodiesterase gene that causes progressive retinal atrophy in the Cardigan Welsh Corgi. *Vet Ophthalmol*. 2002;5:103-106.
4. Keep JM. Clinical aspects of progressive retinal atrophy in the Cardigan Welsh Corgi. *Aust Vet J*. 1972;48:197-199.

OCULAR DISORDERS REPORT CARDIGAN WELSH CORGI

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,796		2017-2021 594		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			2	0.1%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			143	3.8%	19	3.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			16	0.4%	1	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	1	0.2%	0	
UVEA								
93.120 IRIS CYST			0	0.0%	1	0.2%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			107	2.8%	14	2.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.1%	1	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			9	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.1%	0	0.0%	0	
97.120 COLOBOMA			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			15	0.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			111	2.9%	31	5.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			13	0.3%	5	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			13	0.3%	1	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			16	0.4%	4	0.7%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.1%	1	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			7	0.2%	3	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.1%	18	3.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			34	0.9%	3	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			19	0.5%	5	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			16	0.4%	2	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	1	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.1%	2	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			7	0.2%	2	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.1%	1	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.2%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			8	0.2%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			171	4.5%	49	8.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			4	0.1%	1	0.2%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			4	0.1%	1	0.2%	0	

OCULAR DISORDERS REPORT CARDIGAN WELSH CORGI

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	3,796		594		0	
		#	%	#	%	#	%
VITREOUS Continued							
110.320 VITREOUS DEGENERATION SYNERESIS		4	0.1%	1	0.2%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		24	0.6%	1	0.2%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		6	0.2%	1	0.2%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		9	0.2%	0	0.0%	0	
120.400 RETINAL HEMORRHAGE		1	0.0%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		2	0.1%	0	0.0%	0	
120.960 RETINOPATHY		0	0.0%	1	0.2%	0	
OPTIC NERVE							
130.120 OPTIC NERVE HYPOPLASIA		3	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		16	0.4%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		39	1.0%	2	0.3%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		22	0.6%	16	2.7%	0	
NORMAL							
.000 NORMAL GLOBE		3,339	88.0%	499	84.0%	0	

CAROLINA DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAROLINA DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAROLINA DOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		4	100.0%	0	

CATALAN SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CATALAN SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CATALAN SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.150 IRIS COLOBOMA		1	100.0%	0		0	

CAUCASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAUCASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CAUCASIAN SHEPHERD

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	10		9		0	
			#	%	#	%	#	%
EYELIDS								
21.000	ENTROPION, UNSPECIFIED		1	10.0%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED		0	0.0%	1	11.1%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	10.0%	1	11.1%	0	
LENS								
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		0	0.0%	1	11.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		0	0.0%	1	11.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		0	0.0%	1	11.1%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	1	11.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	11.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	5	55.6%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	11.1%	0	
NORMAL								
.000	NORMAL GLOBE		8	80.0%	5	55.6%	0	

CAVALIER KING CHARLES SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1, 2	NO
B.	Keratoconjunctivitis sicca	Not defined	3	NO
C.	Congenital KCS and ichthyosiform dermatosis	Autosomal recessive	4, 5	NO
D.	Entropion	Not defined	1	Breeder option
E.	Distichiasis	Not defined	1	Breeder option
F.	Imperforate lacrimal punctum	Not defined	1	Breeder option
G.	Corneal dystrophy - epithelial/stromal	Not defined	1, 6	Breeder option
H.	Exposure/pigmentary keratitis	Not defined	1	Breeder option
I.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
J.	Cataract	Not defined	1, 2, 7	NO
K.	Y-suture tip opacity	Not defined	1	Breeder option
L.	Vitreous degeneration	Not defined	1	Breeder option
M.	Retinal dysplasia - folds	Not defined	1	Breeder option
N.	Retinal dysplasia - geographic	Not defined	1	NO

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

B. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

C. Congenital KCS and ichthyosiform dermatosis

A syndrome in which dogs are born with severe to absolute keratoconjunctivitis sicca (KCS) which is poorly responsive to lacrimostimulant treatment. Co-morbid congenital dermatopathy affecting haircoat, skin and footpads is severe and requires intensive life-long care. Clinical signs are so devastating that affected dogs are often euthanized.

D. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Imperforate Lacrimal Punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

G. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Cavalier King Charles Spaniel, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

H. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

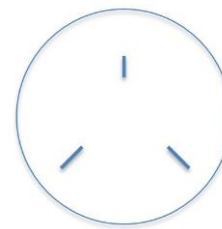
J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Cavalier King Charles Spaniel, onset is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

K. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts -

which would either be breeder option or failing.

L. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

N. Retinal dysplasia – geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT CAVALIER KING CHARLES SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 53,256		2017-2021 16,668		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			77	0.1%	22	0.1%	0	
10.000 GLAUCOMA			3	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			3	0.0%	1	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			126	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			210	0.4%	82	0.5%	0	
22.000 ECTROPION, UNSPECIFIED			10	0.0%	1	0.0%	0	
25.110 DISTICHIASIS			4,861	9.1%	1,462	8.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			42	0.1%	45	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			94	0.2%	39	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	1	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			6	0.0%	3	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			19	0.0%	4	0.0%	0	
CORNEA								
70.210 PANNUS			14	0.0%	5	0.0%	0	
70.220 PIGMENTARY KERATITIS			277	0.5%	117	0.7%	0	
70.700 CORNEAL DYSTROPHY			4,718	8.9%	1,301	7.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			53	0.1%	13	0.1%	0	
UVEA								
93.110 IRIS HYPOPLASIA			4	0.0%	0	0.0%	0	
93.120 IRIS CYST			18	0.0%	6	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			7	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			4	0.0%	1	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			5	0.0%	0	0.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			0	0.0%	3	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			576	1.1%	225	1.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			37	0.1%	5	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			35	0.1%	1	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			44	0.1%	1	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			38	0.1%	46	0.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			11	0.0%	2	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	4	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			2	0.0%	9	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			8	0.0%	4	0.0%	0	
97.120 COLOBOMA			4	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			57	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,943	3.6%	481	2.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			439	0.8%	233	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			148	0.3%	64	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			143	0.3%	58	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			61	0.1%	29	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			217	0.4%	101	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			169	0.3%	80	0.5%	0	

OCULAR DISORDERS REPORT CAVALIER KING CHARLES SPANIEL

Year Examined: Total # Dogs:		1991-2016 53,256		2017-2021 16,668		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.307	PUNCTATE CATARACT, CAPSULAR	85	0.2%	63	0.4%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	394	0.7%	125	0.7%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	290	0.5%	84	0.5%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	167	0.3%	45	0.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	30	0.1%	10	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	84	0.2%	34	0.2%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	246	0.5%	71	0.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	73	0.1%	36	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	31	0.1%	31	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	38	0.1%	49	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	9	0.0%	9	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	7	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	23	0.0%	24	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	10	0.0%	8	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	74	0.1%	134	0.8%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	221	0.4%	19	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	9	0.0%	4	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	16	0.0%	2	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	3,025	5.7%	1,311	7.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	89	0.2%	34	0.2%	0	
110.135	PHPV/ PTVL	31	0.1%	3	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	36	0.1%	9	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	215	0.4%	60	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3,769	7.1%	570	3.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1,524	2.9%	268	1.6%	0	
120.190	RETINAL DYSPLASIA, DETACHED	166	0.3%	25	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	154	0.3%	18	0.1%	0	
120.400	RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	20	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	4	0.0%	0	
120.960	RETINOPATHY	34	0.1%	26	0.2%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	24	0.0%	7	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	13	0.0%	6	0.0%	0	
130.150	OPTIC DISC COLOBOMA	30	0.1%	27	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	596	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	1,149	2.2%	41	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	729	1.4%	759	4.6%	0	
NORMAL							
.000	NORMAL GLOBE	38,459	72.2%	11,521	69.1%	0	

CENTRAL ASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CENTRAL ASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CENTRAL ASIAN SHEPHERD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	14.3%	2	33.3%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	28.6%	1	16.7%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	14.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	14.3%	1	16.7%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			2	28.6%	1	16.7%	0	
OTHER								
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	16.7%	0	
NORMAL								
.000 NORMAL GLOBE			4	57.1%	2	33.3%	0	

CESKY TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CESKY TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CESKY TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 121		2017-2021 22		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			19	15.7%	0	0.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.8%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			8	6.6%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			4	3.3%	2	9.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	1	4.5%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.8%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	4.5%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.8%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.8%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.8%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.8%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.8%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	1.7%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	0.8%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.8%	1	4.5%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			6	5.0%	1	4.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			8	6.6%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.8%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			1	0.8%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	0.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			4	3.3%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.8%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			82	67.8%	18	81.8%	0	

CHART POLSKI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CHART POLSKI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CHART POLSKI

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	1	25.0%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	11.1%	0	0.0%	0	
FUNDUS							
97.110 CHOROIDAL HYPOPLASIA		2	22.2%	0	0.0%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	11.1%	0	0.0%	0	
VITREOUS							
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	11.1%	0	0.0%	0	
OPTIC NERVE							
130.150 OPTIC DISC COLOBOMA		1	11.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		3	33.3%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		3	33.3%	3	75.0%	0	

CHESAPEAKE BAY RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Presumed incomplete dominant	1, 2	NO	
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Hereditary cataracts have been described in the Chesapeake Bay Retriever and affect the young adult dog. They appear as posterior cortical, axial, triangular opacities and the Y suture tips can be affected in both the anterior and posterior cortices. Extension of the cataract into the posterior cortex and progression to impair vision can occur. An autosomal dominant inheritance with incomplete penetrance has been proposed; however, the genetics have not been completely defined and additional studies will be required.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chesapeake Bay Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

A second, less common form of PRA is also present in the Chesapeake Bay Retriever with ophthalmoscopic abnormalities characteristic of mid-stage disease found in dogs between 8-12 months of age. The lesions are progressive and end-stage lesions are evident by 2-3 years of age. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gelatt KN. Cataracts in Chesapeake Bay retrievers. *J Am Vet Med Assoc*. 1979;175:1176-1178.
3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT CHESAPEAKE BAY RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 13,126		2017-2021 1,778		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			7	0.1%	1	0.1%	0	
10.000 GLAUCOMA			4	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			3	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			55	0.4%	3	0.2%	0	
22.000 ECTROPION, UNSPECIFIED			7	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			957	7.3%	160	9.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			3	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			78	0.6%	16	0.9%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	1	0.1%	0	
93.120 IRIS CYST			21	0.2%	9	0.5%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			3	0.0%	2	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			230	1.8%	59	3.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			14	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			46	0.4%	59	3.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	1	0.1%	0	
95.120 CILIARY BODY CYST			2	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			74	0.6%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			559	4.3%	94	5.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			64	0.5%	34	1.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			128	1.0%	19	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			47	0.4%	10	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			12	0.1%	8	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			54	0.4%	9	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			11	0.1%	13	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			49	0.4%	30	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			60	0.5%	18	1.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			228	1.7%	36	2.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			58	0.4%	12	0.7%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			51	0.4%	3	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			22	0.2%	4	0.2%	0	

OCULAR DISORDERS REPORT CHESAPEAKE BAY RETRIEVER

Year Examined: Total # Dogs:		1991-2016 13,126		2017-2021 1,778		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.317	INCIPIENT CATARACT, CAPSULAR	24	0.2%	5	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	1	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.0%	6	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	3	0.2%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	3	0.0%	2	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	12	0.1%	9	0.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	43	0.3%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	956	7.3%	223	12.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	20	0.2%	2	0.1%	0	
110.135	PHPV/ PTVL	10	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	53	0.4%	13	0.7%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	44	0.3%	10	0.6%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	84	0.6%	4	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	50	0.4%	5	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	93	0.7%	3	0.2%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	6	0.0%	5	0.3%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	127	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	335	2.6%	3	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	167	1.3%	109	6.1%	0	
NORMAL							
.000	NORMAL GLOBE	10,708	81.6%	1,256	70.6%	0	

CHIHUAHUA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - endothelial	Not defined	1, 2	NO	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration - anterior chamber - syneresis	Not defined Not defined	1 1	Breeder option Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	3, 4	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

In the Chihuahua, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is suspected to be a heritable disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptotically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort,

intracorneal bullae with subsequent ulceration and keratoconus may develop. Histologically, the primary endothelial disease appears slightly different from the clinically similar disorder of the Boston Terrier.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chihuahua is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Martin CL and Dice PF. Corneal endothelial dystrophy in the dog. *J Am Anim Hosp Assoc.* 1982;18:327.

3. Hyama M, Tada N, Mitsui H, et al. Real-time PCR genotyping in assay for canine progressive rod-cone degeneration and mutant allele frequency in Toy Poodles, Chihuahuas, and Miniature Dachshunds in Japan. *J Vet Med Sci* 2016; 78(3): 481.
4. Downs LM, Hitti R, Pregolato S, et al. Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds. *Vet Ophthalmol.* 2014;17:126-130.

OCULAR DISORDERS REPORT CHIHUAHUA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,642		2017-2021 1,287		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.1%	1	0.1%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			3	0.2%	5	0.4%	0	
25.110 DISTICHIASIS			82	5.0%	44	3.4%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			3	0.2%	4	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.1%	2	0.2%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.2%	2	0.2%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			3	0.2%	3	0.2%	0	
70.700 CORNEAL DYSTROPHY			3	0.2%	6	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			6	0.4%	2	0.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			126	7.7%	58	4.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	0.2%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.4%	7	0.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			49	3.0%	24	1.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			16	1.0%	12	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.2%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	5	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.1%	4	0.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			28	1.7%	14	1.1%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			18	1.1%	8	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.5%	3	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.4%	5	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.2%	4	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.1%	4	0.3%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	3	0.2%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.1%	1	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			4	0.2%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			12	0.7%	1	0.1%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	2	0.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			119	7.2%	65	5.1%	0	

OCULAR DISORDERS REPORT CHIHUAHUA

Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
		1,642		1,287		0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	
110.135	PHPV/ PTVL	2	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	15	0.9%	18	1.4%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	50	3.0%	19	1.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	7	0.4%	3	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.7%	1	0.1%	0	
120.960	RETINOPATHY	1	0.1%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	21	1.3%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	23	1.4%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	2.0%	50	3.9%	0	
NORMAL							
.000	NORMAL GLOBE	1,310	79.8%	1,055	82.0%	0	

CHINESE CRESTED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	4	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAMTS17</i> gene
E.	Vitreous degeneration - anterior chamber - syneresis	Not defined Not defined	1 1	Breeder option Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	4	NO	Mutation in the <i>prcd</i> gene
G.	Retinal atrophy - rod-cone dysplasia type 3 (<i>rcd3</i>)	Autosomal recessive	5, 6	NO	Mutation in the <i>PDE6A</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chinese Crested is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

In the Chinese Crested, a second, but very infrequency type of PRA has been identified that is caused by the mutation in the *PDE6A* gene that causes PRA in Cardigan Welsh Corgis. However, most cases of PRA that test normal for the *prcd* gene defect likely results from a gene defect that is still to be identified.

G. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Chinese Crested is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (*rcd3*). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.
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OCULAR DISORDERS REPORT CHINESE CRESTED

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 6,621		2017-2021 529		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.1%	0	0.0%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	1	0.2%	0	
21.000 ENTROPION, UNSPECIFIED			4	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			41	0.6%	4	0.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			4	0.1%	2	0.4%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			18	0.3%	1	0.2%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			5	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			7	0.1%	1	0.2%	0	
70.700 CORNEAL DYSTROPHY			35	0.5%	4	0.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.0%	1	0.2%	0	
UVEA								
93.110 IRIS HYPOPLASIA			5	0.1%	0	0.0%	0	
93.120 IRIS CYST			3	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			170	2.6%	17	3.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			10	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	0.0%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.0%	0	0.0%	0	
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			158	2.4%	18	3.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			41	0.6%	14	2.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			22	0.3%	1	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			16	0.2%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			5	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			9	0.1%	1	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			11	0.2%	4	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			9	0.1%	3	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			44	0.7%	3	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			31	0.5%	1	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			31	0.5%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			5	0.1%	1	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.0%	1	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.0%	2	0.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			4	0.1%	2	0.4%	0	

OCULAR DISORDERS REPORT CHINESE CRESTED

Year Examined: Total # Dogs:		1991-2016 6,621		2017-2021 529		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.2%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	
100.328	Y-SUTURE TIP OPACITIES	4	0.1%	2	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	26	0.4%	3	0.6%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	28	0.4%	2	0.4%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	274	4.1%	42	7.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	6	0.1%	2	0.4%	0	
110.135	PHPV/ PTVL	2	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	243	3.7%	17	3.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	534	8.1%	23	4.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	31	0.5%	1	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	6	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	1	0.2%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	96	1.4%	3	0.6%	0	
120.400	RETINAL HEMORRHAGE	4	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	
120.960	RETINOPATHY	2	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	4	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	13	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	8	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	68	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	152	2.3%	2	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	47	0.7%	20	3.8%	0	
NORMAL							
.000	NORMAL GLOBE	5,604	84.6%	431	81.5%	0	

CHINESE FOO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Chinese Foo Dog. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Genetic Test Available; No Reference

OCULAR DISORDERS REPORT CHINESE FOO DOG

There are no statistics available for this breed

CHINESE SHAR-PEI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2-4	NO	Mutation in the <i>ADAMTS17</i> gene
B.	Entropion	Not defined	1, 5-8	NO	
C.	Secondary keratitis - chronic	Not defined	1	Breeder option	
D.	Lens luxation	Autosomal recessive	1, 2, 9	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

The condition is a particularly severe problem in the Chinese Shar-Pei and is compounded by breeder selection for facial conformation with heavy skin folds which encourages formation of entropion.

C. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Oliver, JAC, Rustidge S, Pettit L, et al. Evaluation of *ADAMTS17* in Chinese Shar-Pei with primary open-angle glaucoma, primary lens luxation, or both. *Am J Vet Res*. 2018 Jan;79(1): 98-106.
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6. Bedford PGC. Entropion in Shar-Peis (Correspondence). *Vet Rec*. 1984;115:666.
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8. Barnett KC. Inherited eye disease in the dog and cat. *J Small Anim Pract*. 1988;29:462-475.
9. Lazarus JA, Pickett JP, Champagne ES. Primary lens luxation in the Chinese Shar-Pei: clinical and hereditary characteristics. *Vet Ophthalmol*. 1998;1:101-107.

OCULAR DISORDERS REPORT CHINESE SHAR-PEI

Year Examined: Total # Dogs:		1991-2016 608		2017-2021 116		2021 0	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.3%	0	0.0%	0	
10.000	GLAUCOMA	0	0.0%	1	0.9%	0	
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	308	50.7%	38	32.8%	0	
22.000	ECTROPION, UNSPECIFIED	12	2.0%	0	0.0%	0	
25.110	DISTICHIASIS	3	0.5%	0	0.0%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.3%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	1	0.9%	0	
CORNEA							
70.210	PANNUS	29	4.8%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS	11	1.8%	11	9.5%	0	
70.700	CORNEAL DYSTROPHY	4	0.7%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	7	1.2%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	15	2.5%	1	0.9%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.8%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.8%	3	2.6%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.3%	4	3.4%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	
93.810	UVEAL MELANOMA	1	0.2%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.7%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	14	2.3%	2	1.7%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.3%	1	0.9%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	1	0.9%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.3%	1	0.9%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	1.0%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.3%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	9	1.5%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	27	4.4%	3	2.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.7%	1	0.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT CHINESE SHAR-PEI

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	608		116		0	
		#	%	#	%	#	%
OTHER							
900.000	OTHER, UNSPECIFIED	9	1.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	17	2.8%	1	0.9%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	3.5%	10	8.6%	0	
NORMAL							
.000	NORMAL GLOBE	287	47.2%	59	50.9%	0	

CHINOOK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined Not defined	1 1	Breeder option Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal dysplasia - folds	Not defined	1	Breeder option	
D.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	2	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal

dysplasia is undetermined.

- D. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT CHINOOK

Year Examined: Total # Dogs:		1991-2016 1,462		2017-2021 274		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS	5	0.3%	0	0.0%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	4	0.3%	2	0.7%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	2	0.1%	1	0.4%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	90	6.2%	5	1.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	1	0.4%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	2	0.7%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	79	5.4%	14	5.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.5%	4	1.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.2%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	1	0.4%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.3%	2	0.7%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	9	0.6%	4	1.5%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.2%	6	2.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	10	0.7%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	17	1.2%	1	0.4%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.5%	1	0.4%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.6%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.5%	1	0.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	5	0.3%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.1%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	2	0.7%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.4%	0	
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	4	1.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	9	0.6%	1	0.4%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	103	7.0%	28	10.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	17	1.2%	2	0.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	63	4.3%	2	0.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT CHINOOK

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
RETINA Continued								
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.150 OPTIC DISC COLOBOMA			0	0.0%	1	0.4%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			19	1.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			41	2.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			15	1.0%	11	4.0%	0	
NORMAL								
.000 NORMAL GLOBE			1,222	83.6%	231	84.3%	0	

CHOW CHOW

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Autosomal recessive	1-3	NO
B.	Entropion	Not defined	1	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined		NO
D.	Cataract	Not defined	1, 4	NO

DESCRIPTION AND COMMENTS

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

Age of onset in the Chow Chow appears to be anywhere between 3-6 years of age and has been observed as a bilateral condition. Gonioscopy has shown extremely narrow iridocorneal angles and in many regions no evidence of trabecular meshwork.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

Entropion in the Chow Chow has been observed for decades and is definitely related to the amount of skin covering the head and face. Because of the conformation admired by both fanciers and the judges, it is doubtful that we will see a significant change in the incidence of entropion as folds are, in many cases, desired by these individuals. Entropion requires

surgical correction in the Chow Chow to return comfort and decrease chances for vision loss.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Major PPM's have been observed in the Chow Chow. Many ophthalmologists have observed puppies so severely affected that they are temporarily or permanently blind. The blindness is due to adherence of the membranes to the cornea and/or lens.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Chow Chow, the only reported cataract is congenital. The clinical appearance is variable, ranging from small nuclear or capsular opacities to generalized opacity. The central lens (nucleus) is most consistently affected with variable involvement of the peripheral lens (cortex). Concurrent ocular anomalies may include entropion, microphthalmia, persistent pupillary membranes, and retinal folds, although any direct relationship of these latter conditions to the cataract is unclear.

References

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2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol.* 2004;7:97-111.
3. Corcaran KA, Koch SA. Primary glaucoma in the Chow chows. *Prog Vet Comp Ophthalmol.* 1994;4:193-197.
4. Collins BK, Collier LL, Johnson GS, et al. Familial cataracts and concurrent ocular anomalies in chow chows. *J Am Vet Med Assoc.* 1992;200:1485-1491.

OCULAR DISORDERS REPORT CHOW CHOW

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,383		2017-2021 238		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.3%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			3	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			374	27.0%	47	19.7%	0	
22.000 ECTROPION, UNSPECIFIED			25	1.8%	3	1.3%	0	
25.110 DISTICHIASIS			8	0.6%	2	0.8%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			9	0.7%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			25	1.8%	3	1.3%	0	
70.700 CORNEAL DYSTROPHY			8	0.6%	1	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			17	1.2%	0	0.0%	0	
UVEA								
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			5	0.4%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			479	34.6%	72	30.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			17	1.2%	2	0.8%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			57	4.1%	7	2.9%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.6%	1	0.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			16	1.2%	6	2.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.2%	8	3.4%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			30	2.2%	3	1.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			2	0.1%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			5	0.4%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	2	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	0.4%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	0.7%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.2%	2	0.8%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			38	2.7%	5	2.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			5	0.4%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			3	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			2	0.1%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	0	0.0%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			8	0.6%	0	0.0%	0	

OCULAR DISORDERS REPORT CHOW CHOW

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
OPTIC NERVE								
130.120 OPTIC NERVE HYPOPLASIA			1	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			17	1.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			22	1.6%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			23	1.7%	7	2.9%	0	
NORMAL								
.000 NORMAL GLOBE			621	44.9%	107	45.0%	0	

CIRNECO DELL'ETNA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CIRNECO DELL'ETNA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CIRNECO DELL ETNA

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	36		52		0	
			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		1	2.8%	3	5.8%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	2	3.8%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	1	1.9%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	5.6%	2	3.8%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	2.8%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		0	0.0%	1	1.9%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		1	2.8%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		2	5.6%	1	1.9%	0	
OPTIC NERVE								
130.120	OPTIC NERVE HYPOPLASIA		0	0.0%	1	1.9%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	2.8%	1	1.9%	0	
NORMAL								
.000	NORMAL GLOBE		32	88.9%	43	82.7%	0	

CLUMBER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1, 2	Breeder option
B.	Ectropion	Not defined	1	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract.* 1963;4:447-456.

OCULAR DISORDERS REPORT CLUMBER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,739		2017-2021 308		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			6	0.2%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			167	6.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			589	21.5%	73	23.7%	0	
22.000 ECTROPION, UNSPECIFIED			441	16.1%	41	13.3%	0	
25.110 DISTICHIASIS			197	7.2%	39	12.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			5	0.2%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			18	0.7%	5	1.6%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			13	0.5%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			11	0.4%	1	0.3%	0	
70.700 CORNEAL DYSTROPHY			5	0.2%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			0	0.0%	1	0.3%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			65	2.4%	5	1.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.1%	0	0.0%	0	
97.120 COLOBOMA			3	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			15	0.5%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			86	3.1%	18	5.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			20	0.7%	11	3.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			28	1.0%	3	1.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.2%	2	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			16	0.6%	3	1.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	0.2%	4	1.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.0%	2	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			15	0.5%	3	1.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			42	1.5%	7	2.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			7	0.3%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			16	0.6%	1	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			8	0.3%	2	0.6%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			5	0.2%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	2	0.6%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	2	0.6%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.1%	3	1.0%	0	

OCULAR DISORDERS REPORT CLUMBER SPANIEL

Year Examined: Total # Dogs:		1991-2016 2,739		2017-2021 308		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.330 GENERALIZED/ COMPLETE CATARACT		5	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		198	7.2%	45	14.6%	0	
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT		6	0.2%	1	0.3%	0	
110.135 PHPV/ PTVL		3	0.1%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		181	6.6%	7	2.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		9	0.3%	2	0.6%	0	
120.190 RETINAL DYSPLASIA, DETACHED		0	0.0%	1	0.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		15	0.5%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.0%	0	0.0%	0	
120.960 RETINOPATHY		1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.150 OPTIC DISC COLOBOMA		2	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		25	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		64	2.3%	3	1.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		31	1.1%	6	1.9%	0	
NORMAL							
.000 NORMAL GLOBE		1,455	53.1%	139	45.1%	0	

COCKER SPANIEL

(*American)

*The official breed name is Cocker Spaniel. The designation "American" has been used to avoid confusion and emphasize the distinction from the English Cocker Spaniel breed.

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Glaucoma	Not defined	1, 3, 4	NO	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1, 2, 5, 6	Breeder option	
E.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
F.	Prolapsed gland of the third eyelid	Not defined	1, 7	Breeder option	
G.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
H.	Secondary keratitis – chronic	Not defined	1	Passes with no notation	
I.	Cataract	Presumed autosomal recessive	1, 2, 8-11	NO	
J.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 12-14	NO	Mutation in the <i>prcd</i> gene
K.	Retinal dysplasia - folds	Not defined	1, 15	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct adjacent to the eye. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

F. Prolapsed gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

G. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

H. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In this breed, the onset of cataract may occur at an early age (less than 2 years) with rapid progression to maturity and associated with significant lens-induced inflammation.

J. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Cocker Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

K. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Williams LW, Peiffer RL, Gelatt KN, et al. A survey of ocular findings in the American cocker spaniel. *J Am Anim Hosp Assoc.* 1979;15:603-607.
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13. Aguirre GD, Acland GM. Variation in retinal degeneration phenotype inherited at the prcd locus. *Exp Eye Res.* 1988;46:663-687.
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OCULAR DISORDERS REPORT COCKER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 58,408		2017-2021 6,447		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			35	0.1%	4	0.1%	0	
10.000 GLAUCOMA			36	0.1%	7	0.1%	0	
EYELIDS								
20.110 EYELID DERMOID			2	0.0%	0	0.0%	0	
20.140 ECTOPIC CILIA			56	0.1%	1	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			179	0.3%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			159	0.3%	10	0.2%	0	
22.000 ECTROPION, UNSPECIFIED			991	1.7%	30	0.5%	0	
25.110 DISTICHIASIS			29,371	50.3%	3,175	49.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			502	0.9%	272	4.2%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			363	0.6%	92	1.4%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	3	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			8	0.0%	2	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			225	0.4%	23	0.4%	0	
CORNEA								
70.210 PANNUS			497	0.9%	1	0.0%	0	
70.220 PIGMENTARY KERATITIS			508	0.9%	131	2.0%	0	
70.700 CORNEAL DYSTROPHY			1,619	2.8%	140	2.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			39	0.1%	4	0.1%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			2	0.0%	2	0.0%	0	
93.120 IRIS CYST			22	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			8	0.0%	2	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			169	0.3%	28	0.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			31	0.1%	1	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			35	0.1%	1	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			28	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			40	0.1%	39	0.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.0%	3	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	2	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			6	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			33	0.1%	0	0.0%	0	
97.120 COLOBOMA			14	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1,023	1.8%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3,454	5.9%	424	6.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1,159	2.0%	308	4.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			583	1.0%	89	1.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			171	0.3%	43	0.7%	0	

OCULAR DISORDERS REPORT COCKER SPANIEL

Year Examined: Total # Dogs:		1991-2016 58,408		2017-2021 6,447		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	179	0.3%	34	0.5%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	235	0.4%	105	1.6%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	95	0.2%	24	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	125	0.2%	51	0.8%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1,080	1.8%	143	2.2%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1,244	2.1%	130	2.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	325	0.6%	58	0.9%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	111	0.2%	9	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	190	0.3%	21	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	202	0.3%	30	0.5%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	94	0.2%	24	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	62	0.1%	58	0.9%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	59	0.1%	67	1.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	9	0.0%	15	0.2%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	2	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	4	0.0%	2	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	15	0.0%	20	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	4	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	41	0.1%	47	0.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1,027	1.8%	51	0.8%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	21	0.0%	21	0.3%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	73	0.1%	19	0.3%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8,056	13.8%	1,356	21.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	42	0.1%	13	0.2%	0	
110.135	PHPV/ PTVL	9	0.0%	1	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	22	0.0%	3	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	144	0.2%	9	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	6,846	11.7%	315	4.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	168	0.3%	10	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED	9	0.0%	1	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	463	0.8%	12	0.2%	0	
120.400	RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%	0	
120.960	RETINOPATHY	25	0.0%	23	0.4%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	4	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	10	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	112	0.2%	4	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	451	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	1,062	1.8%	24	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	942	1.6%	320	5.0%	0	
NORMAL							
.000	NORMAL GLOBE	23,991	41.1%	2,255	35.0%	0	

COLLIE

(Rough and Smooth varieties)

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia	Not defined	1, 2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
G.	Retinal atrophy - generalized	Not defined	1	NO	
H.	Retinal atrophy- Rod/cone dysplasia type 2- (<i>rcd2</i>)	Autosomal recessive	3-66	NO	Mutation in the <i>RD3</i> gene
I.	Retinal dysplasia - folds	Not defined	1	Breeder option	
J.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 7-31	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Collie. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. In the Collie, because there is significant clinical disease associated with the abnormal hairs, breeding of affected animals should be discouraged.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Collie, this is a particularly serious problem noted frequently on routine screening examination. The majority of persistent pupillary membranes identified on routine screening examinations include iris sheets, and bridging from the iris to cornea and the iris to lens. These may result in vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds. In the Collie, the rod/cone degeneration occurs very rarely and in those cases has not been caused by any of the known genetic mutations.

H. Retinal atrophy - Rod-cone dysplasia type 2- (*rcd2*)

An inherited retinal disease characterized by abortive or abnormal development of rods and cones. The disease can be detected histologically by 6 weeks. Clinical night blindness is observed as early as 6 weeks with total blindness by 1 year of age. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. This form of retinal dysplasia is clinically similar to, but genetically distinct from that seen in the Irish Setter. This condition is caused by an insertion in *RD3*. A DNA test is available.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

J. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT COLLIE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 57,257		2017-2021 8,751		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			877	1.5%	331	3.8%	0	
10.000 GLAUCOMA			7	0.0%	0	0.0%	0	
EYELIDS								
20.110 EYELID DERMOID			1	0.0%	0	0.0%	0	
20.140 ECTOPIC CILIA			5	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			56	0.1%	3	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			8	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			1,069	1.9%	149	1.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			8	0.0%	1	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			5	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			9	0.0%	5	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			3	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			7	0.0%	1	0.0%	0	
70.700 CORNEAL DYSTROPHY			394	0.7%	31	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			12	0.0%	0	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			3	0.0%	5	0.1%	0	
93.120 IRIS CYST			19	0.0%	11	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			23	0.0%	1	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			4	0.0%	7	0.1%	0	
93.180 IRIS SPHINCTER DYSPLASIA			1	0.0%	3	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			9,356	16.3%	2,243	25.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			468	0.8%	120	1.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			124	0.2%	17	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			65	0.1%	8	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			31	0.1%	27	0.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			12	0.0%	2	0.0%	0	
93.810 UVEAL MELANOMA			4	0.0%	1	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	2	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			226	0.4%	265	3.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			39,201	68.5%	6,690	76.4%	0	
97.120 COLOBOMA			2,298	4.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			114	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			556	1.0%	103	1.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			102	0.2%	16	0.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			24	0.0%	5	0.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.0%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			32	0.1%	2	0.0%	0	

OCULAR DISORDERS REPORT COLLIE

Year Examined: Total # Dogs:		1991-2016 57,257		2017-2021 8,751		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	25	0.0%	6	0.1%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	205	0.4%	58	0.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	44	0.1%	15	0.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	100	0.2%	18	0.2%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	112	0.2%	11	0.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	37	0.1%	7	0.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	34	0.1%	9	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	24	0.0%	7	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	149	0.3%	53	0.6%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	28	0.0%	11	0.1%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	3	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	3	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	6	0.0%	3	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	4	0.0%	3	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	49	0.1%	0	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.0%	1	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,097	1.9%	233	2.7%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	380	0.7%	44	0.5%	0	
110.135	PHPV/ PTVL	50	0.1%	3	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	44	0.1%	2	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3,867	6.8%	682	7.8%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	55	0.1%	8	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	98	0.2%	21	0.2%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	813	1.4%	2	0.0%	0	
120.400	RETINAL HEMORRHAGE	105	0.2%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	823	1.4%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	92	0.2%	98	1.1%	0	
120.960	RETINOPATHY	1	0.0%	2	0.0%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	144	0.3%	53	0.6%	0	
130.120	OPTIC NERVE HYPOPLASIA	238	0.4%	38	0.4%	0	
130.150	OPTIC DISC COLOBOMA	4,529	7.9%	773	8.8%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	132	0.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	287	0.5%	20	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	620	1.1%	37	0.4%	0	
NORMAL							
.000	NORMAL GLOBE	14,513	25.3%	1,337	15.3%	0	

COTON DE TULEAR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
B.	Prolapsed gland of third eyelid	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Vitreous degeneration	Not defined	1	Breeder option	
H.	Retinal atrophy (<i>prcd</i>)	Not defined	2, 3	NO	Mutation in the <i>prcd</i> gene
I.	Multifocal retinopathy - <i>cmr2</i>	Autosomal recessive	4, 5	Breeder Option	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Imperforate Lacrimal Punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

B. Prolapse of the gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

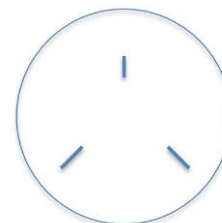
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

H. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Coton de Tulear is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

I. Multifocal retinopathy – *cmr2*

Canine Multifocal Retinopathy type 2 (*cmr2*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There is typically a serous sub-retinal fluid in the Coton de Tulear, although there may be accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 15 weeks to 1 year of age. The lesions typically remain static in size and color beyond 1 year of age. The bullae appear to gradually lose the serous sub-retinal fluid after 4-5 years of age. Discrete areas of tapetal hyper-reflectivity might also be seen. Most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas. Electroretinograms reveal significant differences in photopic flickers in affected dogs.

Canine Multifocal Retinopathy type 2 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Coton du Tulear. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi:

- 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.
4. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967.
 5. Grahn BH, Sandmeyer LL, Breaux C. Retinopathy of Coton de Tulear dogs: clinical manifestations, electroretinographic, ultrasonographic, fluorescein and indocyanine green angiographic, and optical coherence tomographic findings. *Vet Ophthalmol*. 2008;11:242-249.

OCULAR DISORDERS REPORT COTON DE TULEAR

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,241		2017-2021 692		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			4	0.1%	2	0.3%	0	
25.110 DISTICHIASIS			44	0.8%	6	0.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.0%	10	1.4%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			15	0.3%	8	1.2%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			53	1.0%	8	1.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	0	0.0%	0	
93.120 IRIS CYST			4	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			444	8.5%	68	9.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			8	0.2%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.0%	2	0.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			8	0.2%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	1	0.1%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			183	3.5%	33	4.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			15	0.3%	3	0.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			7	0.1%	4	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			5	0.1%	4	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			22	0.4%	5	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	0.1%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.3%	12	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			14	0.3%	3	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			18	0.3%	1	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			10	0.2%	1	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.1%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.1%	1	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			7	0.1%	3	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			11	0.2%	17	2.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.1%	1	0.1%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	0.0%	0	0.0%	0	

OCULAR DISORDERS REPORT COTON DE TULEAR

Year Examined: Total # Dogs:		1991-2016 5,241		2017-2021 692		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	158	3.0%	59	8.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	7	0.1%	2	0.3%	0	
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	44	0.8%	9	1.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	21	0.4%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	11	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	3	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	32	0.6%	4	0.6%	0	
120.370	MULTIFOCAL RETINOPATHY	2	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	3	0.4%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	44	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	152	2.9%	2	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	60	1.1%	30	4.3%	0	
NORMAL							
.000	NORMAL GLOBE	4,473	85.3%	524	75.7%	0	

CURLY-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1, 2	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

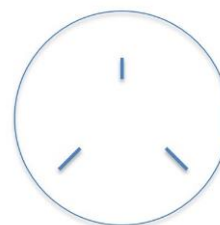
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Curly-Coated Retriever the following cataracts have been reported:

1. **Anterior cortical subcapsular cataract:** Anterior subcapsular striate cortical cataracts usually occur bilaterally, slowly progress and usually occur between 5-8 years of age.
2. **Posterior subcapsular cataract:** Posterior polar subcapsular opacities occur at 2-4 years of age and progress slowly.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67.

OCULAR DISORDERS REPORT CURLY-COATED RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,937		2017-2021 213		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			4	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			11	0.6%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.2%	0	0.0%	0	
25.110 DISTICHIASIS			151	7.8%	15	7.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			3	0.2%	1	0.5%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			14	0.7%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.1%	0	0.0%	0	
93.120 IRIS CYST			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			71	3.7%	14	6.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.3%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			12	0.6%	14	6.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			13	0.7%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			19	1.0%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			115	5.9%	27	12.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			16	0.8%	4	1.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			16	0.8%	3	1.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.2%	4	1.9%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			18	0.9%	21	9.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	5	2.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			14	0.7%	3	1.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			12	0.6%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			13	0.7%	2	0.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			11	0.6%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.3%	2	0.9%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.2%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.5%	0	
100.328 Y-SUTURE TIP OPACITIES			7	0.4%	24	11.3%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			145	7.5%	69	32.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.1%	1	0.5%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			17	0.9%	0	0.0%	0	

OCULAR DISORDERS REPORT CURLY-COATED RETRIEVER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,937		213		0	
			#	%	#	%	#	%
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		18	0.9%	4	1.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		3	0.2%	1	0.5%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		11	0.6%	1	0.5%	0	
120.960	RETINOPATHY		1	0.1%	1	0.5%	0	
120.970	CMR/ CMR-LIKE RETINOPATY		0	0.0%	1	0.5%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		0	0.0%	1	0.5%	0	
130.120	OPTIC NERVE HYPOPLASIA		3	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA		13	0.7%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		16	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		34	1.8%	1	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		28	1.4%	15	7.0%	0	
NORMAL								
.000	NORMAL GLOBE		1,549	80.0%	122	57.3%	0	

CZECHOSLOVAKIAN VLCAK

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CZECHOSLOVAKIAN VLCAK breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT CZECHOSLOVAKIAN VLCAK

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	4.2%	1	1.8%	0	
UVEA								
93.120 IRIS CYST			0	0.0%	2	3.6%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	2	3.6%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	12.5%	1	1.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	1	1.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	4.2%	1	1.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	1	1.8%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	8.3%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	1.8%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			3	12.5%	4	7.3%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	4.2%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	1.8%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	4.2%	0	0.0%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	4.2%	3	5.5%	0	
NORMAL								
.000 NORMAL GLOBE			28	116.7%	46	83.6%	0	

DACHSHUND

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia and multiple ocular defects	Not defined	1-3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Superficial punctate keratitis	Not defined	4	NO	
D.	Corneal dystrophy - endothelial	Not defined	1, 5, 6	NO	
E.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy (<i>crd1</i>)	Autosomal recessive	1, 7-18	NO	Mutation in the <i>RPGRIP</i> gene
H.	Retinopathy - associated with ceroid lipofuscinosis	Autosomal recessive	2, 19-20	NO	Mutation in the <i>TPP1</i> gene
I.	Retinal dysplasia – folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia and multiple ocular anomalies

Microphthalmia is a congenital defect characterized by a small eye often with associated defects of the cornea, anterior chamber, lens and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Dachshund. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Superficial punctate keratitis

Superficial punctate keratitis is characterized by multiple sites of discrete corneal inflammation and/or ulceration and which is suspected to be immune-mediated in etiology. Lesions are typically oval to circular, well-defined and may be associated with an arborizing vascular response.

D. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy – *crd1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram before it is apparent clinically.

In Miniature Dachshunds there is a recessively inherited disorder caused by a 44 base pair insertion in the *RPGRIP1* gene. The insertion presumably truncates the protein and its major C-terminal RPGR binding domain. The resulting disease is called cone-rod dystrophy 1 (*crd1*) as the salient clinical abnormalities are a cone ERG dysfunction which does not correlate with photopic vision defects. The onset of the disease is variable, and is influenced by a second modifier locus which also is located on canine chromosome 15. Dogs homozygous for both

defects have retinal abnormalities on ophthalmoscopy before 1-2 years of age. Dogs homozygous only for the *RPGRIP* insertion may have a late onset (>6 years) retinal degeneration diagnosed by ophthalmoscopy. Although the *RPGRIP1* molecular defect can be identified by means of a DNA test, questions have been raised about its validity given the poor genotype-phenotype correlation. A DNA test is available.

In a previous study using an inbred research colony, a 44-nucleotide insertion (ins44) in exon 2 of *RPGRIP1* was associated with retinal degeneration. Despite concordance of ins44 with retinal degeneration, evidence indicate that there was phenotype-genotype discordance within the miniature long-haired dachshunds that were not directly related to the experimental colony as not all dogs that were homozygous for ins44 were developing early onset retinal degeneration, but were developing retinal degeneration at a much later stage or not at all. In this investigation MAP9 deletion associated with early retinal degeneration onset was identified. Given the new genome assembly, the nominal title is CanFam3.1MAP9 corrected. Deletion was confirmed in early onset retinal degeneration cases and not late onset retinal degeneration cases, there is a variable age of onset and demonstrate the interaction of two independent loci that contribute to the phenotype. This study has shown that *RPGRIP1* ins44/ins44 dogs with early onset retinal degeneration has several polymorphisms in MAP9, some of them potentially harmful, when compared with MAP9 in late onset retinal degeneration dogs. Detection of the presence or absence of MAP early onset retinal degeneration by qPCR can be used to specify early onset or late onset status for ins44 homozygotes. The story, however, is not as straightforward as suggested by the Forman et al. 2016 paper. Unpublished work by K. Miyadera and G. Aguirre in a research colony in which one of the founders originated from a MLHD at the Animal Health Trust finds that dogs that are homozygous for the *RPGRIP1* ins 44 and the newly identified MAP9 deletion still do not show early-onset retinal degeneration. This suggests that there probably is a third genetic locus that interacts with MAP9 and *RPGRIP1* in determining the age of disease onset and severity of the phenotype. Regardless, the identification of the MAP9 deletion is a major finding that will help unravel the complex genetics of this retinal disorder.

H. Retinopathy associated with ceroid lipofuscinosis

Progressive, multifocal serous retinal detachments first appear in Longhaired Dachshunds with late infantile neuronal ceroid lipofuscinosis at age 5-10 months. Late infantile ceroid neuronal lipofuscinosis in Miniature Dachshunds is a fatal, autosomal recessive, inherited lysosomal storage disease characterized by progressive neurodegeneration. The disease results from a defect in the *TPP1* (Tripeptidyl peptidase) gene. Inheritance of the retinopathy is linked to the gene causing late infantile neuronal ceroid lipofuscinosis.

I. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT DACHSHUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 6,433		2017-2021 1,636		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			23	0.4%	1	0.1%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			7	0.1%	2	0.1%	0	
25.110 DISTICHIASIS			400	6.2%	147	9.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			4	0.1%	1	0.1%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	0	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			8	0.1%	3	0.2%	0	
CORNEA								
70.210 PANNUS			3	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			33	0.5%	3	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			9	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			7	0.1%	7	0.4%	0	
93.120 IRIS CYST			4	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			25	0.4%	1	0.1%	0	
93.180 IRIS SPHINCTER DYSPLASIA			0	0.0%	2	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			265	4.1%	91	5.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			26	0.4%	6	0.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			31	0.5%	8	0.5%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			4	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			94	1.5%	96	5.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			12	0.2%	8	0.5%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			2	0.0%	2	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			5	0.1%	2	0.1%	0	
97.120 COLOBOMA			14	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			43	0.7%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			263	4.1%	42	2.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			39	0.6%	17	1.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			16	0.2%	7	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			11	0.2%	4	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			9	0.1%	2	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			12	0.2%	9	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			15	0.2%	6	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			22	0.3%	10	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			50	0.8%	5	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			23	0.4%	1	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			17	0.3%	3	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			18	0.3%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			9	0.1%	3	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			8	0.1%	6	0.4%	0	

OCULAR DISORDERS REPORT DACHSHUND

Year Examined: Total # Dogs:		1991-2016 6,433		2017-2021 1,636		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	4	0.1%	9	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	39	0.6%	2	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	3	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	2	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	343	5.3%	89	5.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	39	0.6%	5	0.3%	0	
110.135	PHPV/ PTVL	15	0.2%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	37	0.6%	4	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	56	0.9%	20	1.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	7	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	124	1.9%	5	0.3%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	1	0.1%	0	
120.960	RETINOPATHY	2	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	20	0.3%	4	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	40	0.6%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	26	0.4%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	89	1.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	198	3.1%	7	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	107	1.7%	80	4.9%	0	
NORMAL							
.000	NORMAL GLOBE	5,003	77.8%	1,172	71.6%	0	

DALMATIAN

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/sphincter dysplasia.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Iris hypoplasia	Not defined	1	Breeder option
E.	Iris sphincter dysplasia	Not defined	1	Breeder option
F.	Cataract	Not defined	1, 2	NO
G.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris Hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Iris sphincter dysplasia

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality has been noted in the Dalmatian breed.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

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OCULAR DISORDERS REPORT DALMATIAN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,954		2017-2021 1,163		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			5	0.2%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			142	4.8%	49	4.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.1%	3	0.3%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			81	2.7%	25	2.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			51	1.7%	15	1.3%	0	
93.120 IRIS CYST			3	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			15	0.5%	1	0.1%	0	
93.180 IRIS SPHINCTER DYSPLASIA			16	0.5%	10	0.9%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			24	0.8%	12	1.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.1%	2	0.2%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			58	2.0%	24	2.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			17	0.6%	11	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			8	0.3%	3	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			9	0.3%	4	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.1%	2	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.2%	2	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.1%	2	0.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			25	0.8%	8	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			14	0.5%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			14	0.5%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	4	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			4	0.1%	1	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.1%	2	0.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	0	0.0%	0	

OCULAR DISORDERS REPORT DALMATIAN

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 2,954		2017-2021 1,163		2021 0	
		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	1	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.2%	0	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	127	4.3%	41	3.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	4	0.3%	0	
110.135	PHPV/ PTVL	2	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.3%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	22	0.7%	4	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	13	0.4%	6	0.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	4	0.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.2%	4	0.3%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	5	0.4%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	1	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	43	1.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	89	3.0%	3	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	118	4.0%	39	3.4%	0	
NORMAL							
.000	NORMAL GLOBE	2,434	82.4%	974	83.7%	0	

DANDIE DINMONT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2, 3	NO
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Dandie Dinmont terrier a 9.5 Mb susceptibility locus has been identified on canine chromosome 8. The definitive mutation has not been determined. A genetic test is not yet available.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

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OCULAR DISORDERS REPORT DANDIE DINMONT TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 274		2017-2021 60		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.4%	0	0.0%	0	
10.000 GLAUCOMA			1	0.4%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			21	7.7%	2	3.3%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			6	2.2%	1	1.7%	0	
UVEA								
93.120 IRIS CYST			1	0.4%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.4%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			27	9.9%	5	8.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.4%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			4	1.5%	3	5.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	1.5%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			29	10.6%	3	5.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			5	1.8%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	1.1%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.4%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.7%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	1.8%	3	5.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	1.8%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			0	0.0%	1	1.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	1.8%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.4%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			31	11.3%	4	6.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	1.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			6	2.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			7	2.6%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	2.6%	1	1.7%	0	
NORMAL								
.000 NORMAL GLOBE			187	68.2%	46	76.7%	0	

DANISH BROHOLMER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH BROHOLMER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

DANISH BROHOLMER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			2	100.0%	0		0	

DANISH SWEDISH FARMDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH SWEDISH FARMDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

DANISH SWEDISH FARMDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	6	10.2%	0	
LENS 100.316 INCIPIENT CATARACT, NUCLEUS 100.345 SIGNIFICANT CATARACTS (SUMMARY)		1 1	6.7% 6.7%	0 0	0.0% 0.0%	0 0	
OTHER 900.100 OTHER, NOT INHERITED 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1 0	6.7% 0.0%	0 2	0.0% 3.4%	0 0	
NORMAL .000 NORMAL GLOBE		14	93.3%	51	86.4%	0	

DOBERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1-5	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1-5 1	Breeder option Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Persistent hyperplastic primary vitreous/ Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Presumed dominant/ incomplete penetrance	1, 6-14	NO
F.	Retinal dysplasia - folds	Not defined	1	Breeder option
G.	Ligneous conjunctivitis	Not defined	15	NO

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (retinal dysplasia). Note that this syndrome is distinct from "E," PHPV/PHTVL, which may also be associated with microphthalmia.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataracts have been infrequently observed in the Doberman Pinscher and there is no specific location attributed to cataracts within the Doberman lens. Most cataracts are bilateral, usually observed within the first two years of life, and may cause significant vision loss.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The condition in the Doberman includes a spectrum of malformations ranging from spots of pigment on the posterior surface of the lens to posterior lenticonus, cataract and a dense fibrous plaque on the posterior surface of the lens. In the more severe forms, partial or complete vision impairment occurs. PHPV has been extensively studied in the Doberman in Europe. This disorder has been observed occasionally in the Doberman in the United States.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease. Ligneous conjunctivitis has also been reported in one Yorkshire Terrier.

References

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13. Anderson DE. The incidence of PHTVL/PHPV in Dobermans and the results of breeding. *J Hered*. 1991;82:21.
14. Boeve MH and Stades FC. Persistent hyperplastic tunica vasculosa lentis and primary vitreous (PHTVL/PHPV) in the dog: A comparative review. *prog Vet Comp Ophthalmol*. 1992;2:163.
15. Ramsey DT, Ketring K, Glaze MB, et al. Ligneous conjunctivitis in four Doberman Pinschers. *J Am Anim Hosp Assoc*. 1996;32:439-447.

OCULAR DISORDERS REPORT DOBERMAN PINSCHER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,535		2017-2021 1,230		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			7	0.1%	0	0.0%	0	
10.000 GLAUCOMA			0	0.0%	1	0.1%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			7	0.1%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			90	1.6%	23	1.9%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	1	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			7	0.1%	2	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			7	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			10	0.2%	3	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			9	0.2%	4	0.3%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			120	2.2%	21	1.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			33	0.6%	2	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			8	0.1%	2	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			4	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			105	1.9%	155	12.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.1%	4	0.3%	0	
93.810 UVEAL MELANOMA			4	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			32	0.6%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			301	5.4%	57	4.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			21	0.4%	9	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			6	0.1%	4	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			5	0.1%	1	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			16	0.3%	9	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			17	0.3%	10	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			42	0.8%	19	1.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			10	0.2%	6	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			18	0.3%	4	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.1%	3	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			9	0.2%	2	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			19	0.3%	8	0.7%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			10	0.2%	8	0.7%	0	

OCULAR DISORDERS REPORT DOBERMAN PINSCHER

Year Examined: Total # Dogs:		1991-2016 5,535		2017-2021 1,230		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	3	0.2%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	8	0.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	14	0.3%	2	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.0%	3	0.2%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	232	4.2%	102	8.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	19	0.3%	11	0.9%	0	
110.135	PHPV/ PTVL	45	0.8%	10	0.8%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	10	0.2%	2	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	97	1.8%	6	0.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	12	0.2%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	12	0.2%	4	0.3%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.2%	0	
120.960	RETINOPATHY	1	0.0%	0	0.0%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	57	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	167	3.0%	6	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	103	1.9%	85	6.9%	0	
NORMAL							
.000	NORMAL GLOBE	4,632	83.7%	861	70.0%	0	

DOGO ARGENTINO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DOGO ARGENTINO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT DOGO ARGENTINO

Year Examined: Total # Dogs:		1991-2016 130		2017-2021 50		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	0	0.0%	1	2.0%	0	
25.110	DISTICHIASIS	1	0.8%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.8%	2	4.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.8%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	14	10.8%	1	2.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.8%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.8%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	1	2.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.8%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	4.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	2.3%	1	2.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	2	1.5%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.8%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8	6.2%	3	6.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.8%	0	0.0%	0	
OTHER							
900.100	OTHER, NOT INHERITED	1	0.8%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	5	10.0%	0	
NORMAL							
.000	NORMAL GLOBE	109	83.8%	41	82.0%	0	

DOGUE DE BORDEAUX

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	2	Breeder option	Mutation in the <i>CNGB3</i> gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT DOGUE DE BORDEAUX

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	319		103		0	
			#	%	#	%	#	%
EYELIDS								
20.160	MACROPALPEBRAL FISSURE		9	2.8%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED		18	5.6%	22	21.4%	0	
22.000	ECTROPION, UNSPECIFIED		35	11.0%	11	10.7%	0	
25.110	DISTICHIASIS		31	9.7%	9	8.7%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		1	0.3%	0	0.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		6	1.9%	6	5.8%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		1	0.3%	0	0.0%	0	
UVEA								
93.120	IRIS CYST		2	0.6%	1	1.0%	0	
93.170	ANTERIOR CHAMBER CYST		0	0.0%	1	1.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		14	4.4%	3	2.9%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		1	0.3%	1	1.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		4	1.3%	1	1.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		5	1.6%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		1	0.3%	1	1.0%	0	
95.120	CILIARY BODY CYST		1	0.3%	1	1.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		9	2.8%	1	1.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	0.3%	1	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		0	0.0%	1	1.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		4	1.3%	1	1.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		1	0.3%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		0	0.0%	2	1.9%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		1	0.3%	1	1.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		1	0.3%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	1	1.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		8	2.5%	7	6.8%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		1	0.3%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		6	1.9%	1	1.0%	0	
120.960	RETINOPATHY		1	0.3%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		6	1.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		10	3.1%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		6	1.9%	4	3.9%	0	
NORMAL								
.000	NORMAL GLOBE		219	68.7%	56	54.4%	0	

DRENTSCH PARTRIJSHOND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DRENTSCH PARTRIJSHOND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT DRENTSCHE PATRIJSHOND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
UVEA 93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	3.2%	0	
LENS 100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	7.7%	2	6.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	7.7%	1	3.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	7.7%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	2	6.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	3.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			2	15.4%	4	12.9%	0	
RETINA 120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	1	3.2%	0	
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	15.4%	1	3.2%	0	
NORMAL .000 NORMAL GLOBE			11	84.6%	26	83.9%	0	

DREVER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DREVER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT DREVER

There are no statistics available for this breed

DUTCH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT DUTCH SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			3	4.9%	0	0.0%	0	
CORNEA								
70.210 PANNUS			0	0.0%	1	1.1%	0	
70.700 CORNEAL DYSTROPHY			1	1.6%	3	3.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	5	5.3%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	3.3%	1	1.1%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			10	16.4%	9	9.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	1.6%	2	2.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	3	3.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	1.6%	1	1.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	1.6%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			0	0.0%	2	2.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	6.6%	2	2.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	1.6%	5	5.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	3.3%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	1.6%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	1.6%	1	1.1%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	2	2.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			12	19.7%	18	18.9%	0	
RETINA								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	1.6%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	1	1.1%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	4.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			0	0.0%	1	1.1%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	6.6%	5	5.3%	0	
NORMAL								
.000 NORMAL GLOBE			46	75.4%	70	73.7%	0	

ECT LANDSEER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ECT LANDSEER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ECT LANDSEER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		2	100.0%	0	

ENGLISH COCKER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Glaucoma	Not defined	1, 3-4	NO	
C.	Distichiasis	Not defined	1, 4, 5	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 6	Breeder option	
	- iris to cornea	Not defined	1, 6	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1, 6-9	NO	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 10-14	NO	Mutation in the <i>prcd</i> gene
G.	Central progressive retinal atrophy	Not defined	15-17	NO	
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

Glaucoma in the English Cocker Spaniel is recognized in England. The frequency and significance of this disease in the breed in the United States is not known, but is probably low.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the English Cocker Spaniel, this is a particularly serious problem as the majority of PPMs identified on routine screening examination bridge from the iris to the cornea and are associated with corneal opacities which may result in vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts have been reported in Red Cocker Spaniels, presumably English Cocker Spaniels, in Denmark. The cataracts affected the anterior capsule; in some cases the cortex and/or nucleus were opaque. Associated findings in some dogs were persistent pupillary membrane (PPM) and/or microphthalmia. It is likely that these cataracts are part of a syndrome characterized by multiple congenital ocular anomalies. The condition is familial, but a specific mode of inheritance has not been defined.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the English Cocker Spaniel is *prcd*

which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However, in the English Cocker Spaniel, the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

G. Central progressive retinal atrophy (CPRA)

A progressive retinal degeneration in which photoreceptor degeneration occurs secondary to disease of the underlying pigment epithelium. Progression is slow and some animals may never lose vision. CPRA is a frequent occurrence in England, but is uncommon elsewhere.

CPRA is characterized by the appearance of brown spots and patches primarily in the tapetal fundus and retinal degeneration. These areas are created by an accumulation of autofluorescent lipopigment within the retinal pigment epithelium cells. These changes are consistent with retinal changes observed in Vitamin E deficiency. Neurologic signs including ataxia and proprioceptive deficits have also been identified in affected dogs.

In the English Cocker Spaniel, retinal lesions of CPRA have been related to an underlying abnormal metabolism of Vitamin E resulting in a systemic deficiency.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

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OCULAR DISORDERS REPORT ENGLISH COCKER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 11,147		2017-2021 1,195		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			14	0.1%	1	0.1%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.110 EYELID DERMOID			1	0.0%	0	0.0%	0	
20.140 ECTOPIC CILIA			6	0.1%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			3	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			46	0.4%	7	0.6%	0	
22.000 ECTROPION, UNSPECIFIED			97	0.9%	1	0.1%	0	
25.110 DISTICHIASIS			1,997	17.9%	175	14.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			19	0.2%	9	0.8%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			12	0.1%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			6	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			10	0.1%	1	0.1%	0	
70.220 PIGMENTARY KERATITIS			11	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			97	0.9%	11	0.9%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			37	0.3%	0	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			5	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			6	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			141	1.3%	26	2.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			42	0.4%	3	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			185	1.7%	7	0.6%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			10	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			43	0.4%	42	3.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			18	0.2%	11	0.9%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			0	0.0%	1	0.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			172	1.5%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			687	6.2%	61	5.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			115	1.0%	36	3.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			56	0.5%	5	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			23	0.2%	6	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			14	0.1%	4	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			38	0.3%	6	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			28	0.3%	6	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			18	0.2%	13	1.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			133	1.2%	6	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			136	1.2%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			86	0.8%	7	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			27	0.2%	1	0.1%	0	

OCULAR DISORDERS REPORT ENGLISH COCKER SPANIEL

Year Examined: Total # Dogs:		1991-2016 11,147		2017-2021 1,195		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.316	INCIPIENT CATARACT, NUCLEUS	63	0.6%	2	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	19	0.2%	2	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	5	0.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	5	0.4%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	5	0.4%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	3	0.0%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	3	0.0%	5	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	101	0.9%	2	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,049	9.4%	118	9.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	4	0.3%	0	
110.135	PHPV/ PTVL	4	0.0%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	23	0.2%	4	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	163	1.5%	20	1.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	15	0.1%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	424	3.8%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	
120.960	RETINOPATHY	3	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	15	0.1%	3	0.3%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	47	0.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	242	2.2%	6	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	172	1.5%	63	5.3%	0	
NORMAL							
.000	NORMAL GLOBE	7,542	67.7%	809	67.7%	0	

ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ENGLISH COONHOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	1	100.0%	0	

ENGLISH FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT ENGLISH FOXHOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	33.3%	0		0	
NORMAL .000 NORMAL GLOBE		2	66.7%	0		0	

ENGLISH JACK RUSSELL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH JACK RUSSELL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH JACK RUSSELL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		2	100.0%	1	100.0%	0	

ENGLISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia recessive type 1 (<i>rcd4</i>)	Autosomal recessive	2, 3	NO	Mutation in the <i>C2orf71</i> gene
E.	Retinal dysplasia- folds	Not defined	1	Breeder option	
F.	Ceroid lipofuscinosis	Autosomal recessive	4-9	NO	Mutation in the <i>CLN8</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

F. Ceroid lipofuscinosis

An inherited disease of humans and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's Disease.) A DNA test is available.

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OCULAR DISORDERS REPORT ENGLISH SETTER

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,735		101		0	
			#	%	#	%	#	%
EYELIDS								
21.000	ENTROPION, UNSPECIFIED		8	0.5%	3	3.0%	0	
22.000	ECTROPION, UNSPECIFIED		3	0.2%	0	0.0%	0	
25.110	DISTICHIASIS		71	4.1%	0	0.0%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		2	0.1%	0	0.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		13	0.7%	1	1.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		3	0.2%	0	0.0%	0	
UVEA								
93.120	IRIS CYST		1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		63	3.6%	5	5.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		5	0.3%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		7	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	3	3.0%	0	
93.810	UVEAL MELANOMA		0	0.0%	1	1.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		5	0.3%	0	0.0%	0	
100.210	CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		63	3.6%	8	7.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		6	0.3%	2	2.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		11	0.6%	2	2.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		0	0.0%	2	2.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		5	0.3%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		2	0.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		2	0.1%	1	1.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		5	0.3%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		8	0.5%	1	1.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		2	0.1%	2	2.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		2	0.1%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		2	0.1%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		2	0.1%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	1	1.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	2	2.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS		0	0.0%	1	1.0%	0	
100.328	Y-SUTURE TIP OPACITIES		4	0.2%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		3	0.2%	1	1.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		59	3.4%	15	14.9%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		7	0.4%	0	0.0%	0	
110.135	PHPV/ PTVL		1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		4	0.2%	1	1.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		35	2.0%	3	3.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		15	0.9%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED		1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		22	1.3%	0	0.0%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		1	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA		1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT

ENGLISH SETTER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,735		101		0	
			#	%	#	%	#	%
OTHER								
900.000 OTHER, UNSPECIFIED			6	0.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			53	3.1%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	0.3%	3	3.0%	0	
NORMAL								
.000 NORMAL GLOBE			1,463	84.3%	72	71.3%	0	

ENGLISH SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene
B.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 3-4	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the English Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

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OCULAR DISORDERS REPORT ENGLISH SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	1.5%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			5	3.8%	0	0.0%	0	
25.110 DISTICHIASIS			0	0.0%	3	13.0%	0	
CORNEA								
70.210 PANNUS			1	0.8%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			1	0.8%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			6	4.5%	1	4.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.8%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	2.3%	2	8.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			2	1.5%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.8%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	4.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.8%	2	8.7%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.8%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.8%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	1.5%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			3	2.3%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			4	3.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			15	11.3%	3	13.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			2	1.5%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			4	3.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			8	6.0%	3	13.0%	0	
NORMAL								
.000 NORMAL GLOBE			105	78.9%	15	65.2%	0	

ENGLISH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
G.	Retinal atrophy - <i>cord-1</i>	Autosomal recessive	1, 3	NO	Mutation in the <i>RPGRIP1</i> gene
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 4-6, 9	NO	
I.	Retinal dysplasia - geographic	Not defined	10	NO	
J.	Refractive error	Not defined	7, 8	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the English Springer Spaniel this usually involves the lower lateral lid margin.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted

E. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataract in the English Springer Spaniel is reported to be a familial trait usually involving the posterior subcapsular region of the lens that progresses slowly.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy - *cord-1*

Cord-1 PRA in the English Springer Spaniel has an onset of clinical signs at 2 to 9 years of age leading to blindness in most affected dogs. *Cord1* PRA in the English Springer Spaniel has been described as beginning with increased granularity of the fundus or tiny hyporeflective brown or grey patches in the far peripheral tapetum. Over time, these abnormalities become more diffuse with mottling over much of the tapetum. Vessel attenuation accompanies the more diffuse changes. In advanced cases, there is generalized tapetal hyperreflectivity and vessel attenuation. Pedigree analysis has shown *cord-1* in the English Springer Spaniel to be an autosomal recessive trait. A mutation in the *RPGRIP1*

gene in cone-rod dystrophy (*cord1*) was found through genetic testing to be associated with one form of PRA in English Springer Spaniels, but not all clinically affected dogs have the *RPGRIP1* mutation, implying that other mutations have yet to be identified. A DNA test is available. The test is accurate only for this mutation and will not identify other forms of PRA. Not all dogs homozygous for the *RPGRIP1* genotype demonstrate the phenotype clinically.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

The relationship between folds and geographic/detached lesions has been a topic of dispute for many years. It is the consensus of the English Springer Spaniel Field Trial Association Heritable Defects Committee (the parent breed club in the United States) that none of the forms of retinal dysplasia are desirable in a breeding animal.

I. Retinal dysplasia - geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

J. Refractive Myopia

A condition of the eye where the light that comes in does not directly focus on the retina but in front of it. In common terminology, "near-sighted." This condition has been shown to have a genetic component in English Springer Spaniels, although the exact mode of inheritance has not been determined.

References

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2. Lheriteau E, Petit L, Weber M, et al. Successful gene therapy in the RPGRIP1-deficient dog: a large model of cone-rod dystrophy. *Mol Ther*. 2014;22:265-277. PMID: 24091916
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OCULAR DISORDERS REPORT ENGLISH SPRINGER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 48,151		2017-2021 7,165		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			26	0.1%	3	0.0%	0	
10.000 GLAUCOMA			5	0.0%	2	0.0%	0	
EYELIDS								
20.110 EYELID DERMOID			2	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			3	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			282	0.6%	59	0.8%	0	
22.000 ECTROPION, UNSPECIFIED			57	0.1%	6	0.1%	0	
25.110 DISTICHIASIS			383	0.8%	47	0.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			4	0.0%	8	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			11	0.0%	1	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			8	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			6	0.0%	1	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.0%	1	0.0%	0	
70.700 CORNEAL DYSTROPHY			592	1.2%	103	1.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			12	0.0%	1	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			11	0.0%	4	0.1%	0	
93.120 IRIS CYST			15	0.0%	3	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			4	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			28	0.1%	3	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			2	0.0%	3	0.0%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			0	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			3,644	7.6%	589	8.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			118	0.2%	8	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			90	0.2%	2	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			48	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			78	0.2%	66	0.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			16	0.0%	2	0.0%	0	
93.810 UVEAL MELANOMA			2	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	1	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			4	0.0%	0	0.0%	0	
97.120 COLOBOMA			5	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			97	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,202	2.5%	191	2.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			239	0.5%	83	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			118	0.2%	16	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			54	0.1%	19	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			26	0.1%	5	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			101	0.2%	16	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			60	0.1%	27	0.4%	0	

OCULAR DISORDERS REPORT ENGLISH SPRINGER SPANIEL

Year Examined: Total # Dogs:		1991-2016 48,151		2017-2021 7,165		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.307	PUNCTATE CATARACT, CAPSULAR	66	0.1%	43	0.6%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	210	0.4%	37	0.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	203	0.4%	35	0.5%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	106	0.2%	13	0.2%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	24	0.0%	4	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	42	0.1%	9	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	70	0.1%	13	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	32	0.1%	18	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	9	0.0%	5	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	5	0.0%	10	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	3	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	5	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	4	0.0%	3	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	19	0.0%	16	0.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	89	0.2%	4	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	2	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	27	0.1%	3	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,578	3.3%	386	5.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	243	0.5%	61	0.9%	0	
110.135	PHPV/ PTVL	38	0.1%	5	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	201	0.4%	33	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1,899	3.9%	162	2.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	728	1.5%	50	0.7%	0	
120.190	RETINAL DYSPLASIA, DETACHED	125	0.3%	4	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	484	1.0%	29	0.4%	0	
120.400	RETINAL HEMORRHAGE	8	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	57	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	2	0.0%	0	
120.960	RETINOPATHY	20	0.0%	7	0.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	2	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	10	0.0%	5	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	8	0.0%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	13	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	336	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	726	1.5%	9	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	436	0.9%	198	2.8%	0	
NORMAL							
.000	NORMAL GLOBE	39,563	82.2%	5,642	78.7%	0	

ENGLISH TOY SPANIEL

(King Charles, Prince Charles, Ruby, Blenheim)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO
E.	Persistent hyperplastic primary vitreous /Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Presumed dominant/ incomplete penetrance	1	NO
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option
G.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures, which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Onset of cataract in the English Toy Spaniel is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

F. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT ENGLISH TOY SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,141		2017-2021 414		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			4	0.4%	3	0.7%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			10	0.9%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			56	4.9%	6	1.4%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.3%	0	0.0%	0	
25.110 DISTICHIASIS			127	11.1%	30	7.2%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.2%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			20	1.8%	5	1.2%	0	
70.700 CORNEAL DYSTROPHY			148	13.0%	76	18.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.4%	2	0.5%	0	
UVEA								
93.120 IRIS CYST			1	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			13	1.1%	10	2.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			5	0.4%	3	0.7%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.2%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			10	0.9%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			64	5.6%	14	3.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			20	1.8%	10	2.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			20	1.8%	2	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			7	0.6%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			6	0.5%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			7	0.6%	2	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			21	1.8%	11	2.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			26	2.3%	10	2.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			23	2.0%	7	1.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			3	0.3%	5	1.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			14	1.2%	1	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			16	1.4%	1	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			4	0.4%	4	1.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			3	0.3%	6	1.4%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			2	0.2%	1	0.2%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.2%	4	1.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.1%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.3%	1	0.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			20	1.8%	2	0.5%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			3	0.3%	0	0.0%	0	

OCULAR DISORDERS REPORT ENGLISH TOY SPANIEL

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
LENS Continued								
100.345 SIGNIFICANT CATARACTS (SUMMARY)			212	18.6%	69	16.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			81	7.1%	58	14.0%	0	
110.135 PHPV/ PTVL			14	1.2%	6	1.4%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			21	1.8%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			60	5.3%	21	5.1%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			8	0.7%	4	1.0%	0	
120.190 RETINAL DYSPLASIA, DETACHED			2	0.2%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			6	0.5%	1	0.2%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			1	0.1%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			1	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			55	4.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			38	3.3%	2	0.5%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			55	4.8%	22	5.3%	0	
NORMAL								
.000 NORMAL GLOBE			586	51.4%	184	44.4%	0	

ENTLEBUCHER MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Passes with no notation	
	- lens pigment foci/no strands				
C.	Cataract	Presumed autosomal recessive	2, 3	NO	
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2, 4	NO	Mutation in the <i>prcd</i> gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Cataracts in the Entlebucher Mountain Dog generally become evident in young to middle-aged dogs (5.5 +/- 2.6 years). The opacities typically begin in the posterior subcapsular/capsular polar region along the suture lines as early as 1-2 years of age. Most dogs are affected with bilaterally symmetrical cataracts, which may or may not progress. Pedigree analysis suggests an autosomal recessive mode of inheritance.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Entlebucher Mountain Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Spiess BM. [Inherited eye diseases in the Entlebucher Mountain Dog]. *Schweizer Archiv fur Tierheilkunde*. 1994;136:105-110. Vererbte Augenkrankheiten beim Entlebucher Sennenhund. PMID: 8171308
3. Heitmann M, Hamann H, Brahm R, et al. Analysis of prevalence of presumed inherited eye diseases in Entlebucher Mountain Dogs. *Vet Ophthalmol*. 2005;8:145-151. PMID: 15910366

4. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT ENTLEBUCHER MOUNTAIN DOG

Year Examined: Total # Dogs:		1991-2016 1,032		2017-2021 317		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS	11	1.1%	1	0.3%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.3%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	5	0.5%	1	0.3%	0	
UVEA							
93.120	IRIS CYST	2	0.2%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	50	4.8%	10	3.2%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.4%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.2%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	0.8%	11	3.5%	0	
LENS							
100.210	CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	64	6.2%	24	7.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.5%	11	3.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	40	3.9%	10	3.2%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	7	0.7%	2	0.6%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.2%	1	0.3%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.4%	1	0.3%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.3%	5	1.6%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	14	1.4%	11	3.5%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	1.3%	2	0.6%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	72	7.0%	21	6.6%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	9	0.9%	3	0.9%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.4%	1	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.4%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	11	1.1%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.2%	3	0.9%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	9	0.9%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	199	19.3%	71	22.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	1	0.3%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	3	0.9%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	6	0.6%	8	2.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	27	2.6%	4	1.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	7	0.7%	1	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	30	2.9%	1	0.3%	0	
120.960	RETINOPATHY	2	0.2%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.2%	1	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT

ENTLEBUCHER MOUNTAIN DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,032		317		0	
			#	%	#	%	#	%
OTHER								
900.000 OTHER, UNSPECIFIED			20	1.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			41	4.0%	1	0.3%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			25	2.4%	26	8.2%	0	
NORMAL								
.000 NORMAL GLOBE			761	73.7%	217	68.5%	0	

EPAGNEUL BRETON

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the EPAGNEUL BRETON breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT EPAGNEUL BRETON

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	16.7%	2	6.5%	0	
LENS 100.311 INCIPIENT CATARACT, ANTERIOR CORTEX 100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX 100.328 Y-SUTURE TIP OPACITIES 100.345 SIGNIFICANT CATARACTS (SUMMARY)		1 1 1 3	16.7% 16.7% 16.7% 50.0%	0 0 0 0	0.0% 0.0% 0.0% 0.0%	0 0 0 0	
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	16.7%	1	3.2%	0	
NORMAL .000 NORMAL GLOBE		3	50.0%	28	90.3%	0	

ESTRELA MOUNTAIN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ESTRELA MOUNTAIN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

ESTRELA MOUNTAIN DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			3	100.0%	1	100.0%	0	

EURASIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2-4	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Cataracts	Not defined	1	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Boillot T, Rosolen SG, Dulaurent T, Goulle F, Thomas P, Isard PF, Azoulay T, Lafarge-Beurlet S, Woods M, Lavillegrand S, Ivkovic I, Neveux N, Sahel JA, Picaud S, Froger N. Determination of morphological, biometric and biochemical susceptibilities in healthy Eurasier dogs with suspected inherited glaucoma. PLoS One. 2014 Nov 7;9(11):e111873. doi: 10.1371/journal.pone.0111873. PMID: 25380252
3. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011;14:121-126. Epub 2011/03/04. PMID: 21366828
4. Rosolen SG, Boillot T, Dulaurent T, et al. Morphological, biometrical and biochemical susceptibilities for glaucoma in a healthy Eurasier dog - ECVO 2014 abstract #44. *Vet Ophthalmol*. 2014;17:E23.

OCULAR DISORDERS REPORT EURASIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 116		2017-2021 102		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			37	31.9%	25	24.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	1.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			3	2.6%	3	2.9%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	1.7%	2	2.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	2	2.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	1.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	6.0%	4	3.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	2	2.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	1.7%	1	1.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			5	4.3%	1	1.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.9%	1	1.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.9%	3	2.9%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	1.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	1.7%	1	1.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			11	9.5%	11	10.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.9%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			0	0.0%	1	1.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	1.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			5	4.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			5	4.3%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	3.4%	1	1.0%	0	
NORMAL								
.000 NORMAL GLOBE			72	62.1%	62	60.8%	0	

FIELD SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation in the <i>prcd</i> gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Field Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet.* 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet.* 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT FIELD SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,577		2017-2021 738		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	2	0.3%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			6	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			10	0.4%	1	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			11	0.4%	0	0.0%	0	
25.110 DISTICHIASIS			162	6.3%	31	4.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			8	0.3%	10	1.4%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			30	1.2%	4	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			159	6.2%	52	7.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.2%	2	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			7	0.3%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			17	0.7%	31	4.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.2%	2	0.3%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	0.1%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			127	4.9%	31	4.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			21	0.8%	12	1.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.1%	3	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			5	0.2%	3	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			8	0.3%	1	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	0.2%	3	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			12	0.5%	9	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			16	0.6%	10	1.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			6	0.2%	2	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.1%	3	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	2	0.3%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			5	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			8	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.2%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			9	0.3%	1	0.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.1%	1	0.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			116	4.5%	51	6.9%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			4	0.2%	1	0.1%	0	
110.135 PHPV/ PTVL			4	0.2%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	0.0%	3	0.4%	0	

OCULAR DISORDERS REPORT FIELD SPANIEL

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	2,577		738		0	
		#	%	#	%	#	%
VITREOUS Continued							
110.320 VITREOUS DEGENERATION SYNERESIS		2	0.1%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		259	10.1%	37	5.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		12	0.5%	1	0.1%	0	
120.190 RETINAL DYSPLASIA, DETACHED		1	0.0%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		3	0.1%	2	0.3%	0	
120.400 RETINAL HEMORRHAGE		4	0.2%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.0%	0	0.0%	0	
120.960 RETINOPATHY		0	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		3	0.1%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA		1	0.0%	1	0.1%	0	
130.150 OPTIC DISC COLOBOMA		0	0.0%	2	0.3%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		47	1.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		61	2.4%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		65	2.5%	23	3.1%	0	
NORMAL							
.000 NORMAL GLOBE		1,871	72.6%	544	73.7%	0	

FILA BRASILEIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FILA BRASILEIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

FILA BRASILEIRO

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
OTHER 900.000 OTHER, UNSPECIFIED		1	25.0%	0		0	
NORMAL .000 NORMAL GLOBE		4	100.0%	0		0	

FINNISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene
D.	Multifocal retinopathy - <i>cmr3</i>	Autosomal recessive	3, 4	NO	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the form of PRA in the Finnish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in

dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

D. Multifocal retinopathy (*cmr3*)

Canine Multifocal Retinopathy type 3 (*cmr3*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Clinically the disease is similar to that seen in the Bullmastiff and Coton deTulear, but the mutation in the Bestrophin 1 gene (*BEST1* alias *VMD2*) is different. The multifocal retinopathy seen in the Lapponian Herder is caused by a deletion at position 1,388 and a substitution at position 1,466 and is therefore called *cmr3*. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425
3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007 May;48:1959-1967. PMID: 17460247
4. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One*. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650; PMCID: PMC4985128.

OCULAR DISORDERS REPORT FINNISH LAPPHUND

Year Examined: Total # Dogs:		1991-2016 567		2017-2021 207		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	0.2%	1	0.5%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.5%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.2%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	57	10.1%	19	9.2%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.2%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	1.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.4%	6	2.9%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	38	6.7%	14	6.8%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.9%	3	1.4%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	1.8%	3	1.4%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	2	1.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.5%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.7%	3	1.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.5%	1	0.5%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.5%	4	1.9%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.2%	1	0.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	3	1.4%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.4%	1	0.5%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.5%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	3	1.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	4	1.9%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.5%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	3	1.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.2%	1	0.5%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	31	5.5%	35	16.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	10	1.8%	1	0.5%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.2%	0	0.0%	0	
120.960	RETINOPATHY	1	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	10	1.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	14	2.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.6%	5	2.4%	0	
NORMAL							
.000	NORMAL GLOBE	465	82.0%	146	70.5%	0	

FINNISH SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT FINNISH SPITZ

Year Examined: Total # Dogs:		1991-2016 248		2017-2021 22		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.4%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	2	0.8%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.8%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.8%	8	36.4%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.4%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	13.3%	2	9.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.8%	0	0.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.4%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.8%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	2	9.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	4.5%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	9	3.6%	3	13.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	1.6%	1	4.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	3	1.2%	1	4.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.8%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	2.4%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	3	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	8	3.2%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.8%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	196	79.0%	12	54.5%	0	

FLAT-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2-4	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Retinopathy	Not defined	1	Breeder Option

Description and Comments

A. Glaucoma (with pectinate ligament abnormality)

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

Flat-Coated Retrievers have been shown to have a higher prevalence of pectinate ligament abnormalities compared with other breeds. There is a significant association between pectinate ligament abnormalities and glaucoma in this breed. The heritability of pectinate ligament abnormalities in Flat-Coated Retrievers is estimated at 0.7. Since glaucoma and pectinate ligament abnormalities are closely associated, glaucoma may also be heritable.

In a recent report, pectinate ligament abnormalities were prevalent and significantly associated with age in a population of Flat-Coated Retrievers in the UK.

Due to the incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong

recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

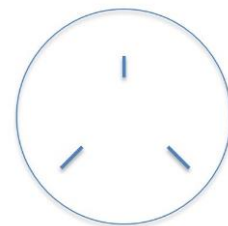
Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinopathy

Patchy to focal unilateral or bilateral hyper reflective tapetal lesions or regions of retinal thinning, most frequently peripheral but occasionally central. Details regarding age of onset and progression of lesions or their significance have not been characterized.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. I. Objectives, technique and results of a PLD survey. *Vet Ophthalmol.* 1998;1:85-90. PMID: 11397215
3. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. II. Assessment of prevalence and heritability. *Vet Ophthalmol.* 1998;1:91-99. PMID: 11397216
4. Oliver JA, Ekiri A, Mellersh CS. Prevalence of pectinate ligament dysplasia and associations with age, sex and intraocular pressure in the Basset Hound, Flat-Coated Retriever and Dandie Dinmont Terrier. *Can Genet Epidemiol* 2016 March 12;3:1doi: 10.1186/s40575-016-0033-1. PMID: 26973793

OCULAR DISORDERS REPORT FLAT-COATED RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 9,135		2017-2021 1,848		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			3	0.0%	0	0.0%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			9	0.1%	2	0.1%	0	
20.160 MACROPALPEBRAL FISSURE			2	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			17	0.2%	4	0.2%	0	
22.000 ECTROPION, UNSPECIFIED			34	0.4%	1	0.1%	0	
25.110 DISTICHIASIS			1,142	12.5%	259	14.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	0	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			0	0.0%	1	0.1%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	1	0.1%	0	
70.700 CORNEAL DYSTROPHY			57	0.6%	9	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	0	0.0%	0	
93.120 IRIS CYST			27	0.3%	4	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			2	0.0%	2	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			234	2.6%	73	4.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			14	0.2%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			3	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			76	0.8%	62	3.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			2	0.0%	2	0.1%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			16	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,042	11.4%	286	15.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			261	2.9%	191	10.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			29	0.3%	9	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			14	0.2%	7	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			39	0.4%	23	1.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			58	0.6%	57	3.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			21	0.2%	30	1.6%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			47	0.5%	33	1.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			46	0.5%	17	0.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			23	0.3%	4	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			18	0.2%	10	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			6	0.1%	5	0.3%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			12	0.1%	5	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			8	0.1%	7	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			9	0.1%	2	0.1%	0	

OCULAR DISORDERS REPORT FLAT-COATED RETRIEVER

Year Examined: Total # Dogs:		1991-2016 9,135		2017-2021 1,848		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	1	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	43	0.5%	69	3.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.1%	2	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	0	0.0%	0	
<i>100.345 SIGNIFICANT CATARACTS (SUMMARY)</i>		661	7.2%	472	25.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	14	0.2%	8	0.4%	0	
110.135	PHPV/ PTVL	5	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	2	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.0%	3	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	19	0.2%	8	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	12	0.1%	3	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	53	0.6%	3	0.2%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	3	0.2%	0	
120.960	RETINOPATHY	18	0.2%	15	0.8%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	7	0.1%	4	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	21	0.2%	10	0.5%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	160	1.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	269	2.9%	4	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	189	2.1%	142	7.7%	0	
NORMAL							
.000	NORMAL GLOBE	6,842	74.9%	1,087	58.8%	0	

FRENCH BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
E.	Cataract	Autosomal recessive	1, 2	NO	Mutation in the <i>HSF4</i> gene
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the French Bulldog, the condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Mellersh CS, Pettitt L, Forman OP, et al. Identification of mutations in *HSF4* in dogs of three different breeds with hereditary cataracts. *Vet Ophthalmol*. 2006;9:369-378. PMID: 16939467

OCULAR DISORDERS REPORT FRENCH BULLDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,340		2017-2021 2,621		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	4	0.2%	0	
20.160 MACROPALPEBRAL FISSURE			3	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			44	1.0%	38	1.4%	0	
22.000 ECTROPION, UNSPECIFIED			7	0.2%	1	0.0%	0	
25.110 DISTICHIASIS			287	6.6%	139	5.3%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			35	0.8%	49	1.9%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			4	0.1%	1	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			7	0.2%	3	0.1%	0	
CORNEA								
70.210 PANNUS			4	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			26	0.6%	12	0.5%	0	
70.700 CORNEAL DYSTROPHY			34	0.8%	28	1.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			6	0.1%	1	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	2	0.1%	0	
93.120 IRIS CYST			9	0.2%	2	0.1%	0	
93.150 IRIS COLOBOMA			1	0.0%	3	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			111	2.6%	65	2.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.1%	2	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			61	1.4%	16	0.6%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			3	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			8	0.2%	6	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			43	1.0%	40	1.5%	0	
93.810 UVEAL MELANOMA			2	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			97	2.2%	46	1.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			22	0.5%	17	0.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			10	0.2%	6	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			11	0.3%	10	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			5	0.1%	3	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			10	0.2%	10	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			6	0.1%	17	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			44	1.0%	17	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			15	0.3%	4	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.5%	4	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			12	0.3%	7	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			8	0.2%	8	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.0%	5	0.2%	0	

OCULAR DISORDERS REPORT FRENCH BULLDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		4,340		2,621		0	
		#	%	#	%	#	%
LENS Continued							
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX		1	0.0%	3	0.1%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX		0	0.0%	2	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS		1	0.0%	7	0.3%	0	
100.328 Y-SUTURE TIP OPACITIES		2	0.0%	1	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT		18	0.4%	2	0.1%	0	
100.340 RESORBING/ HYPERMATURE CATARACT		0	0.0%	1	0.0%	0	
100.345 <i>SIGNIFICANT CATARACTS (SUMMARY)</i>		198	4.6%	124	4.7%	0	
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT		18	0.4%	19	0.7%	0	
110.135 PHPV/ PTVL		1	0.0%	2	0.1%	0	
110.320 VITREOUS DEGENERATION SYNERESIS		9	0.2%	7	0.3%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		98	2.3%	45	1.7%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		13	0.3%	9	0.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		1	0.0%	0	0.0%	0	
120.400 RETINAL HEMORRHAGE		1	0.0%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.0%	0	0.0%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS		1	0.0%	0	0.0%	0	
120.960 RETINOPATHY		2	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		1	0.0%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		65	1.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		91	2.1%	8	0.3%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		67	1.5%	116	4.4%	0	
NORMAL							
.000 NORMAL GLOBE		3,539	81.5%	2,016	76.9%	0	

FRENCH POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FRENCH POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

FRENCH POINTER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1		2		0	
			#	%	#	%	#	%
LENS								
100.328 Y-SUTURE TIP OPACITIES			1	100.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	100.0%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			0	0.0%	2	100.0%	0	

FRENCH SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FRENCH SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT FRENCH SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	50.0%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	2	11.8%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	1	5.9%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	1	5.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	50.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	5.9%	0	
LENS								
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	50.0%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	50.0%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	50.0%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	50.0%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	50.0%	1	5.9%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	5.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			0	0.0%	1	5.9%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			5	250.0%	3	17.6%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			1	50.0%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	150.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	5.9%	0	
NORMAL								
.000 NORMAL GLOBE			0	0.0%	11	64.7%	0	

GERMAN LONGHAIRED POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GERMAN LONGHAIRED POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT GERMAN LONGHAIRD POINTER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		10		25		0	
		#	%	#	%	#	%
EYELIDS							
21.000 ENTROPION, UNSPECIFIED		0	0.0%	1	4.0%	0	
UVEA							
93.120 IRIS CYST		1	10.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		2	20.0%	1	4.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		1	10.0%	1	4.0%	0	
LENS							
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX		0	0.0%	2	8.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	2	8.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX		0	0.0%	2	8.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX		0	0.0%	2	8.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	8	32.0%	0	
VITREOUS							
110.320 VITREOUS DEGENERATION SYNERESIS		0	0.0%	1	4.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		1	10.0%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		7	70.0%	17	68.0%	0	

GERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder Option
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Persistent hyperplastic tunica vasculosa lentis (PHTVL)	Not defined	2, 3	NO
E.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

There may be more than one type of inherited cataract in German Pinschers. One form is reported in Finland with a later age of onset in which a pedigree analysis suggested autosomal recessive or incomplete dominant inheritance (4). Another form is reported in Germany with an earlier age of onset in which a pedigree analysis suggested autosomal recessive inheritance (5). Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent tunica vasculosa lentis results from the failure of regression of the embryologic vascular network which surrounds the developing lens. This disorder has been observed in German Pinschers in Finland and Germany. A pedigree analysis suggested recessive or incomplete dominant inheritance (4).

E. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT GERMAN PINSCHER

Year Examined: Total # Dogs:		1991-2016 1,224		2017-2021 385		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	6	0.5%	8	2.1%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	2	0.5%	0	
70.700	CORNEAL DYSTROPHY	20	1.6%	1	0.3%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	9	0.7%	1	0.3%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	1.0%	13	3.4%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	81	6.6%	31	8.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	27	2.2%	14	3.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	30	2.5%	8	2.1%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.5%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.7%	2	0.5%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.8%	3	0.8%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.4%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	8	0.7%	8	2.1%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	24	2.0%	8	2.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	41	3.3%	6	1.6%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.7%	5	1.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.5%	1	0.3%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.7%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.6%	3	0.8%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.7%	5	1.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	2	0.5%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.2%	4	1.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.1%	1	0.3%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	2	0.5%	0	
100.328	Y-SUTURE TIP OPACITIES	5	0.4%	1	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	8	0.7%	2	0.5%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	209	17.1%	78	20.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	0	0.0%	0	
110.135	PHPV/ PTVL	4	0.3%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	14	1.1%	2	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.2%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	
120.960	RETINOPATHY	2	0.2%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	10	0.8%	5	1.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	6	0.5%	1	0.3%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	26	2.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	31	2.5%	1	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	24	2.0%	29	7.5%	0	

OCULAR DISORDERS REPORT

GERMAN PINSCHER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,224		385		0	
			#	%	#	%	#	%
NORMAL								
.000 NORMAL GLOBE			985	80.5%	274	71.2%	0	

GERMAN SHEPHERD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Plasmoma/atypical pannus	Not defined	1	NO	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1, 2	Breeder option	
D.	Chronic superficial keratitis/pannus	Not defined	1, 3-9	NO	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
F.	Cataract - Cortical	Presumed autosomal recessive	1, 10	NO	
G.	Cone degeneration - hemeralopia/ achromatopsia	Autosomal recessive	11	NO	Mutation in the <i>CNGA3</i> gene
H.	Retinal dysplasia - folds	Not defined	1, 12	Breeder option	
I.	Micropapilla	Not defined	1	Breeder option	
J.	Limbal melanoma	Not defined	13	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Plasmoma/atypical pannus

Bilateral lymphocytic/plasmocytic infiltration of the nictitating membranes which may occur independent of corneal Pannus.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans which may also occur independent of corneal disease.

The German Shepherd Dog has a higher incidence of pannus than any other breed. The MHC class II risk haplotype has been shown. Although there are likely several other genes and environmental factors that contribute to CSK, a recent paper suggested that MHC class II is a major genetic risk factor. Dogs with the risk haplotype were 2.7 times more likely to develop CSK. Homozygosity of the risk haplotype increased the risk of CSK to over eightfold.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Cortical: Reported by Barnett in Great Britain, opacities are first apparent at 8-12 weeks of age, in the posterior cortex and progress to involve the Y-sutures and nucleus. The equatorial subcapsular cortex is unaffected. No progression is noted after 1-2 years of age. Test breeding suggests an autosomal recessive mode of inheritance.

G. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness and colorblindness. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A 5-month-old German Shepherd puppy with vision loss during daylight hours was recently identified with a mutation in the *CNGA3* gene.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

K. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been

noted in the German Shepherd, Labrador and Golden Retriever.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract.* 1983;24:63-83.
3. Campbell LH, Okuda HK, Lipton DE, et al. Chronic superficial keratitis in dogs: detection of cellular hypersensitivity. *Am J Vet Res.* 1975;36:669-671. PMID: 1169896
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OCULAR DISORDERS REPORT GERMAN SHEPHERD DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,908		2017-2021 1,028		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			8	0.2%	1	0.1%	0	
10.000 GLAUCOMA			3	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			3	0.1%	3	0.3%	0	
22.000 ECTROPION, UNSPECIFIED			4	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			55	1.1%	3	0.3%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.1%	0	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			15	0.3%	12	1.2%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			4	0.1%	1	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			112	2.3%	20	1.9%	0	
70.220 PIGMENTARY KERATITIS			1	0.0%	1	0.1%	0	
70.700 CORNEAL DYSTROPHY			228	4.6%	49	4.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			21	0.4%	4	0.4%	0	
93.170 ANTERIOR CHAMBER CYST			2	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			68	1.4%	20	1.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			16	0.3%	2	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			9	0.2%	4	0.4%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.0%	2	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			14	0.3%	10	1.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	2	0.2%	0	
93.810 UVEAL MELANOMA			2	0.0%	1	0.1%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			28	0.6%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			261	5.3%	85	8.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			41	0.8%	17	1.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			14	0.3%	5	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			19	0.4%	2	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.0%	4	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			27	0.6%	19	1.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			51	1.0%	36	3.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.3%	12	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			39	0.8%	5	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			31	0.6%	8	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.4%	5	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	2	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			8	0.2%	2	0.2%	0	

OCULAR DISORDERS REPORT GERMAN SHEPHERD DOG

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	4,908		1,028		0	
			#	%	#	%	#	%
LENS Continued								
100.316	INCIPIENT CATARACT, NUCLEUS		71	1.4%	21	2.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		7	0.1%	9	0.9%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	2	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		1	0.0%	1	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		1	0.0%	1	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES		0	0.0%	1	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS		1	0.0%	3	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR		1	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES		11	0.2%	19	1.8%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		22	0.4%	4	0.4%	0	
100.340	RESORBING/ HYPERMATURE CATARACT		0	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		8	0.2%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		415	8.5%	180	17.5%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		7	0.1%	2	0.2%	0	
110.135	PHPV/ PTVL		3	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		5	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		11	0.2%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		94	1.9%	13	1.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		19	0.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		21	0.4%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		4	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS		2	0.0%	0	0.0%	0	
120.960	RETINOPATHY		2	0.0%	0	0.0%	0	
120.970	CMR/ CMR-LIKE RETINOPATY		0	0.0%	2	0.2%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		28	0.6%	12	1.2%	0	
130.120	OPTIC NERVE HYPOPLASIA		35	0.7%	2	0.2%	0	
130.150	OPTIC DISC COLOBOMA		4	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		58	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		145	3.0%	5	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		92	1.9%	59	5.7%	0	
NORMAL								
.000	NORMAL GLOBE		3,744	76.3%	717	69.7%	0	

GERMAN SHORTHAIRED POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	
F.	Cone degeneration - (achromatopsia)	Autosomal recessive	2, 3	NO	Mutation in the <i>CNGB3</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation,

specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

F. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (*CNGB3*) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Sidjanin DJ, Lowe JK, McElwee JL, et al. Canine *CNGB3* mutations establish cone degeneration as orthologous to the human achromatopsia locus *ACHM3*. *Human Molecular Genetics*. 2002;11:1823-1833. PMID: 12140184
3. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of *CNGB3* is identical by descent in multiple canine breeds and causes achromatopsia. *BMC Genet*. 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

OCULAR DISORDERS REPORT GERMAN SHORTHAIRED POINTER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 6,556		2017-2021 2,134		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			10	0.2%	8	0.4%	0	
22.000 ECTROPION, UNSPECIFIED			4	0.1%	1	0.0%	0	
25.110 DISTICHIASIS			243	3.7%	114	5.3%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			3	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	1	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			20	0.3%	2	0.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	1	0.0%	0	
93.120 IRIS CYST			6	0.1%	3	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.0%	1	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			442	6.7%	144	6.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			17	0.3%	2	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.1%	3	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			19	0.3%	28	1.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			329	5.0%	75	3.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			47	0.7%	23	1.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			53	0.8%	15	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			16	0.2%	5	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.1%	6	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			24	0.4%	13	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			35	0.5%	23	1.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			20	0.3%	19	0.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			19	0.3%	4	0.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			94	1.4%	20	0.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.3%	3	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			18	0.3%	4	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			25	0.4%	5	0.2%	0	

OCULAR DISORDERS REPORT GERMAN SHORTHAIRED POINTER

Year Examined: Total # Dogs:		1991-2016 6,556		2017-2021 2,134		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.317	INCIPIENT CATARACT, CAPSULAR	14	0.2%	8	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	8	0.1%	0	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	1	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	8	0.1%	12	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	14	0.2%	2	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		437	6.7%	166	7.8%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	16	0.2%	19	0.9%	0	
110.135	PHPV/ PTVL	15	0.2%	2	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	22	0.3%	9	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	133	2.0%	23	1.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	25	0.4%	3	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	0.1%	1	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	3	0.0%	0	0.0%	0	
120.960	RETINOPATHY	5	0.1%	4	0.2%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	5	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	99	1.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	135	2.1%	3	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	84	1.3%	91	4.3%	0	
NORMAL							
.000	NORMAL GLOBE	5,305	80.9%	1,614	75.6%	0	

GERMAN SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GERMAN SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

GERMAN SPANIEL

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	0		0	

GERMAN SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	

Description and Comments

A. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT GERMAN SPITZ

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	5		45		0	
			#	%	#	%	#	%
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	20.0%	1	2.2%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		0	0.0%	1	2.2%	0	
LENS								
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		0	0.0%	1	2.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	1	2.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		0	0.0%	1	2.2%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	3	6.7%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		0	0.0%	7	15.6%	0	
110.135	PHPV/ PTVL		0	0.0%	1	2.2%	0	
RETINA								
120.960	RETINOPATHY		1	20.0%	0	0.0%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	2.2%	0	
NORMAL								
.000	NORMAL GLOBE		4	80.0%	33	73.3%	0	

GERMAN WIREHAired POINTER

(Drathaar, Deutsch Drathaar)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT GERMAN WIREHAired POINTER

Year Examined: Total # Dogs:		1991-2016 775		2017-2021 378		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS	9	1.2%	7	1.9%	0	
CORNEA							
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	0.3%	0	
UVEA							
93.110	IRIS HYPOPLASIA	1	0.1%	1	0.3%	0	
93.120	IRIS CYST	0	0.0%	1	0.3%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	1.5%	18	4.8%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.6%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	3.0%	14	3.7%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.3%	1	0.3%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.8%	2	0.5%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	3	0.8%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.6%	3	0.8%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.8%	2	0.5%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.1%	4	1.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	11	1.4%	3	0.8%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.1%	1	0.3%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.4%	1	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.3%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	48	6.2%	21	5.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.3%	2	0.5%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	3	0.4%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.4%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	1	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	9	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	8	1.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	2.1%	10	2.6%	0	
NORMAL							
.000	NORMAL GLOBE	679	87.6%	326	86.2%	0	

GIANT SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Y-suture tip opacity	Not defined	1	Breeder option	
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation in the <i>prcd</i> gene
	Retinal Atrophy	Autosomal recessive	2	NO	Mutation in the <i>NECAP1</i> gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

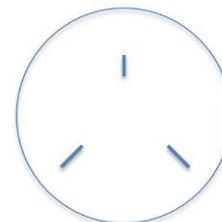
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A genetic test is available.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Hitti, R. J., et al. (2019). "Whole Genome Sequencing of Giant Schnauzer Dogs with Progressive Retinal Atrophy Establishes NECAP1 as a Novel Candidate Gene for Retinal Degeneration." Genes (Basel) 10(5). PMID: 31117272

OCULAR DISORDERS REPORT GIANT SCHNAUZER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,219		2017-2021 426		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.2%	0	
25.110 DISTICHIASIS			5	0.4%	2	0.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	1	0.2%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			10	0.8%	3	0.7%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.2%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			1	0.1%	3	0.7%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			2	0.2%	1	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			59	4.8%	10	2.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	0.3%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.5%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			10	0.8%	13	3.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.2%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			5	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			58	4.8%	24	5.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			9	0.7%	10	2.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			9	0.7%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	5	1.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.2%	1	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			18	1.5%	9	2.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.2%	2	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			25	2.1%	3	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.7%	2	0.5%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			4	0.3%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.2%	2	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.3%	4	0.9%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			5	0.4%	4	0.9%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			100	8.2%	46	10.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			6	0.5%	6	1.4%	0	
110.135 PHPV/ PTVL			5	0.4%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			27	2.2%	3	0.7%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	2	0.5%	0	

OCULAR DISORDERS REPORT GIANT SCHNAUZER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,219		426		0	
			#	%	#	%	#	%
RETINA Continued								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			8	0.7%	0	0.0%	0	
120.960 RETINOPATHY			2	0.2%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	0.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			26	2.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			19	1.6%	1	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			14	1.1%	17	4.0%	0	
NORMAL								
.000 NORMAL GLOBE			1,022	83.8%	343	80.5%	0	

GLEN OF IMAAL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy - Cone rod dystrophy (<i>crd3</i>)	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAM9</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Cone rod dystrophy

A form of late-onset PRA identified in Glen of Imaal Terriers. Ophthalmoscopic lesions are typically diagnosed by 5 years of age, however lesions may be present as early as 3 years of age in affected dogs. Two distinct phenotypes are observed in affected Glen of Imaal Terriers. The most common phenotype is subtle but generalized tapetal hyperreflectivity and retinal vascular attenuation that progresses over 1 - 2 years after initial examination. The less common phenotype is a focal mid-temporal (area centralis) area of distinct tapetal hyperreflectivity without generalized retinal disease. This lesion may remain unchanged for over a year but will progress to generalized retinal atrophy by 2 - 4 years after initial examination. ERG dysfunction can be observed as early as 15 weeks of age. The disorder is caused by a mutation present in the *ADAM9* gene. A DNA test is available that will unequivocally identify normal, affected, and carrier dogs. The

test is accurate only for this mutation and will not identify other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Goldstein O, Mezey JG, Boyko AR, et al. An *ADAM9* mutation in canine cone-rod dystrophy 3 establishes homology with human cone-rod dystrophy 9. *Mol Vis*. 2010;16:1549-1569. PMID: 20806078
3. Kropatsch R, Petrasch-Parwez E, Seelow D, et al. Generalized progressive retinal atrophy in the Irish Glen of Imaal Terrier is associated with a deletion in the *ADAM9* gene. *Mol Cell Probes*. 2010;24:357-363. PMID: 20691256

OCULAR DISORDERS REPORT GLEN OF IMAAL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 652		2017-2021 174		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.2%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			2	0.3%	0	0.0%	0	
25.110 DISTICHIASIS			23	3.5%	7	4.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.6%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.6%	0	
UVEA								
93.120 IRIS CYST			2	0.3%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	2	1.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.2%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			56	8.6%	6	3.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	1.2%	3	1.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.2%	2	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.9%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.6%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.3%	1	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.5%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.5%	2	1.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	1.1%	1	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			6	0.9%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.3%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.2%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.2%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			44	6.7%	11	6.3%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.2%	1	0.6%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.3%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			7	1.1%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			4	0.6%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			23	3.5%	1	0.6%	0	
120.960 RETINOPATHY			1	0.2%	0	0.0%	0	
OPTIC NERVE								
130.120 OPTIC NERVE HYPOPLASIA			1	0.2%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			5	0.8%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			12	1.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			12	1.8%	2	1.1%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			27	4.1%	6	3.4%	0	

OCULAR DISORDERS REPORT
GLEN OF IMAAL TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			526	80.7%	149	85.6%	0	

GOLDEN RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmos	Autosomal recessive	2	NO	Mutation in the <i>SIX6</i> gene
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
E.	Uveal cysts	Not defined	1, 3-5	Breeder option	
F.	Pigmentary uveitis	Not defined	1, 3-6	NO	
G.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 7	Breeder option Passes with no notation	
H.	Cataract	Not defined	1, 7-12	NO	
I.	Y-suture tip opacity	Not defined	1	Breeder option	
J.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
K.	Vitreous degeneration	Not defined	1	Breeder option	
L.	Retinal atrophy <i>prcd</i>	Autosomal recessive	1, 12, 13	NO	Mutation in the <i>prcd</i> gene
	<i>PRA1</i>	Autosomal recessive	14	NO	Mutation in the <i>SLC4A3</i> gene
	<i>PRA2</i>	Autosomal recessive	15, 16	NO	Mutation in the <i>TTC8</i> gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
M.	Retinal dysplasia - folds	Not defined	1, 17	Breeder option	
N.	Retinal dysplasia - geographic	Not defined	1, 17	NO	
O.	Limbal melanoma	Not defined	18	NO	

Description and Comments

A. Microphthalmos

A congenital anomaly in which the globe is abnormally small. Commonly associated with multiple ocular malformations and when severe, may affect vision.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge

on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Pigmentary uveitis

A unique uveitis observed in the Golden Retriever that is not associated with other ocular or systemic disorders. Adhesions develop between iris and lens and the peripheral iris and cornea. Pigment dispersion (exfoliation) occurs across the anterior lens capsule from the pigmented cells of the posterior iris. Other complications include secondary cataract and obstructive glaucoma. Onset is usually between 5-10 years of age.

G. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

H. Cataract

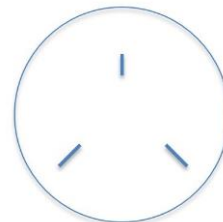
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most common cataract reported in the Golden Retriever is a posterior polar (posterior cortical) cataract. These are generally bilateral, although an occasional unilateral affliction may be observed. These focal opacities will occasionally remain stationary. These cataracts are usually observed between 9 months and 3 years of age. A more generalized cataract is also observed in this breed and is not always associated with the previously mentioned polar cataract. There are also cataract changes involving the Y sutures which may or may not progress.

The existence of cataracts in the Golden Retriever, often with limited clinical significance, presents problems with breeder recognition as the majority of these dogs do not evidence visual impairment. It is strongly recommended that all Golden Retrievers that are used in breeding programs be examined annually as cataract changes have been observed in multiple locations of the lens and variable age of onset.

I. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

L. Retinal atrophy

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Golden Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*)

gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

In addition, two other known mutations that cause PRA are present in the breed. Golden Retriever PRA 1 (GR PRA1) is an autosomal recessive trait and is the predominant form in European lines of Golden Retrievers. Golden Retriever PRA 2 (GR PRA2) has also been identified within the breed. Therefore three different DNA tests are available. However these tests will only detect these three mutations. Syndromic effects in Golden Retrievers seems to be mild.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

N. Retinal dysplasia – geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

O. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predispositions have been noted in the German Shepherd Dog, and Labrador and Golden Retrievers.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT GOLDEN RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 165,520		2017-2021 46,359		2021 0	
	#	%	#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA	53	0.0%	8	0.0%	0			
10.000 GLAUCOMA	32	0.0%	1	0.0%	0			
EYELIDS								
20.110 EYELID DERMOID	3	0.0%	0	0.0%	0			
20.140 ECTOPIC CILIA	54	0.0%	7	0.0%	0			
20.160 MACROPALPEBRAL FISSURE	22	0.0%	0	0.0%	0			
21.000 ENTROPION, UNSPECIFIED	383	0.2%	79	0.2%	0			
22.000 ECTROPION, UNSPECIFIED	107	0.1%	7	0.0%	0			
25.110 DISTICHIASIS	17,646	10.7%	4,046	8.7%	0			
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	38	0.0%	44	0.1%	0			
40.910 KERATOCONJUNCTIVITIS SICCA	5	0.0%	2	0.0%	0			
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%	0			
51.100 THIRD EYELID CARTILAGE ANOMALY	17	0.0%	8	0.0%	0			
52.110 PROLAPSED GLAND OF THE THIRD EYELID	42	0.0%	0	0.0%	0			
CORNEA								
70.210 PANNUS	11	0.0%	1	0.0%	0			
70.220 PIGMENTARY KERATITIS	20	0.0%	13	0.0%	0			
70.700 CORNEAL DYSTROPHY	683	0.4%	238	0.5%	0			
70.730 CORNEAL ENDOTHELIAL DEGENERATION	39	0.0%	6	0.0%	0			
UVEA								
90.250 PIGMENTARY UVEITIS	1,082	0.7%	535	1.2%	0			
93.110 IRIS HYPOPLASIA	4	0.0%	3	0.0%	0			
93.120 IRIS CYST	6,882	4.2%	1,985	4.3%	0			
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	17	0.0%	0	0.0%	0			
93.150 IRIS COLOBOMA	20	0.0%	3	0.0%	0			
93.170 ANTERIOR CHAMBER CYST	887	0.5%	1,354	2.9%	0			
93.180 IRIS SPHINCTER DYSPLASIA	1	0.0%	2	0.0%	0			
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3,635	2.2%	1,335	2.9%	0			
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	118	0.1%	21	0.0%	0			
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	86	0.1%	11	0.0%	0			
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	111	0.1%	1	0.0%	0			
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	529	0.3%	691	1.5%	0			
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	46	0.0%	22	0.0%	0			
93.810 UVEAL MELANOMA	27	0.0%	16	0.0%	0			
95.120 CILIARY BODY CYST	758	0.5%	378	0.8%	0			
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	2	0.0%	1	0.0%	0			
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA	9	0.0%	0	0.0%	0			
97.120 COLOBOMA	8	0.0%	0	0.0%	0			
LENS								
100.200 CATARACT, UNSPECIFIED	952	0.6%	0	0.0%	0			
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	10,084	6.1%	3,375	7.3%	0			
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1,526	0.9%	1,170	2.5%	0			
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2,686	1.6%	759	1.6%	0			
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	920	0.6%	717	1.5%	0			

OCULAR DISORDERS REPORT GOLDEN RETRIEVER

Year Examined: Total # Dogs:		1991-2016 165,520		2017-2021 46,359		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	194	0.1%	96	0.2%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1,006	0.6%	301	0.6%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	496	0.3%	438	0.9%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	702	0.4%	532	1.1%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1,108	0.7%	512	1.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3,378	2.0%	897	1.9%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1,194	0.7%	710	1.5%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	78	0.0%	24	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	778	0.5%	150	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	435	0.3%	328	0.7%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	368	0.2%	228	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	50	0.0%	82	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	95	0.1%	138	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	27	0.0%	61	0.1%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	2	0.0%	3	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	13	0.0%	22	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	20	0.0%	53	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	14	0.0%	33	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	190	0.1%	233	0.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	359	0.2%	33	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	6	0.0%	13	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	32	0.0%	2	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	16,597	10.0%	7,533	16.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	164	0.1%	94	0.2%	0	
110.135	PHPV/ PTVL	37	0.0%	12	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	20	0.0%	7	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	271	0.2%	84	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2,059	1.2%	469	1.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	831	0.5%	223	0.5%	0	
120.190	RETINAL DYSPLASIA, DETACHED	38	0.0%	5	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	175	0.1%	11	0.0%	0	
120.400	RETINAL HEMORRHAGE	18	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	28	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	3	0.0%	4	0.0%	0	
120.960	RETINOPATHY	39	0.0%	49	0.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	3	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	12	0.0%	11	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	39	0.0%	5	0.0%	0	
130.150	OPTIC DISC COLOBOMA	57	0.0%	12	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1,783	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	3,032	1.8%	105	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2,449	1.5%	2,023	4.4%	0	
NORMAL							
.000	NORMAL GLOBE	124,074	75.0%	30,425	65.6%	0	

GORDON SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Passes with no notation	
	- lens pigment foci/no strands	Not defined	1		
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - rod-cone dysplasia type 4 (<i>rcd4</i>)	Autosomal recessive	2	NO	Mutation in the <i>C2orf71</i> gene
F.	Cone degeneration - achromatopsia	Not defined	3	NO	
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

F. Cone degeneration - achromatopsia

Suspected inherited retinopathy characterized by degeneration of the cone receptors and loss of vision in bright light. Age of onset is variable. Ophthalmoscopic examination is normal. The ERG abnormalities are more suggestive of a cone-rod dystrophy. The mode of inheritance and genetic mutation are not yet known.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT

GORDON SETTER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,288		2017-2021 302		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			9	0.4%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			16	0.7%	1	0.3%	0	
22.000 ECTROPION, UNSPECIFIED			54	2.4%	2	0.7%	0	
25.110 DISTICHIASIS			44	1.9%	2	0.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.1%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	1	0.3%	0	
CORNEA								
70.210 PANNUS			3	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			8	0.3%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			19	0.8%	1	0.3%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			114	5.0%	43	14.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.3%	1	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			4	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			17	0.7%	15	5.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.2%	1	0.3%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			83	3.6%	12	4.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			11	0.5%	3	1.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			11	0.5%	1	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	0.2%	1	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			8	0.3%	4	1.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			8	0.3%	5	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.3%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			15	0.7%	2	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.3%	1	0.3%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.3%	1	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			7	0.3%	1	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	1	0.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			10	0.4%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			114	5.0%	20	6.6%	0	

OCULAR DISORDERS REPORT GORDON SETTER

Year Examined: Total # Dogs:		1991-2016 2,288		2017-2021 302		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	14	0.6%	2	0.7%	0	
110.135	PHPV/ PTVL	7	0.3%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	5	0.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	37	1.6%	3	1.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	17	0.7%	2	0.7%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	8	0.3%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	8	0.3%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	40	1.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	59	2.6%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	1.4%	11	3.6%	0	
NORMAL							
.000	NORMAL GLOBE	1,856	81.1%	221	73.2%	0	

GRAND BASSET GRIFFON VENDEEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GRAND BASSET GRIFFON VENDEEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT GRAND BASSET GRIFFON VENDEEN

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		80		98		0		
		#	%	#	%	#	%	
EYELIDS								
25.110	DISTICHIASIS	1	1.3%	0	0.0%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	5.0%	3	3.1%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	6.3%	2	2.0%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	1.0%	0		
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	6.3%	4	4.1%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	3.8%	5	5.1%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.3%	0	0.0%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	1.3%	0	0.0%	0		
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	1.0%	0		
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.0%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	1.0%	0		
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	1.3%	1	1.0%	0		
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.0%	0		
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	2	2.0%	0		
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	2.0%	0		
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.0%	0		
100.327	INCOMPLETE CATARACT, CAPSULAR	1	1.3%	0	0.0%	0		
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	1.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	4	5.0%	11	11.2%	0		
VITREOUS								
110.135	PHPV/ PTVL	1	1.3%	0	0.0%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	1	1.3%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	1.3%	0	0.0%	0		
OPTIC NERVE								
130.110	MICROPAPILLA	0	0.0%	1	1.0%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	2	2.5%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	1	1.3%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	2.0%	0		
NORMAL								
.000	NORMAL GLOBE	61	76.3%	78	79.6%	0		

GREAT DANE

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects associated with partial albinism	Presumed autosomal dominant	1, 2	NO
B.	Glaucoma	Not defined	1, 3	NO
C.	Entropion	Not defined	1	Breeder option
D.	Ectropion	Not defined	1	Breeder option
E.	Distichiasis	Not defined	1	Breeder option
F.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
G.	Prolapsed gland of the third eyelid	Not defined	4	Breeder option
H.	Uveal cysts	Not defined	1, 5	Breeder option
I.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
J.	Cataract	Not defined	1	NO

Description and Comments

A. Microphthalmia with multiple ocular defects associated with partial albinism

Multiple ocular defects are seen associated with partial albinism (white or light coat color) and deafness in Great Danes. The abnormalities are thought to stem from a common developmental defect. Ocular defects are anterior segment dysgenesis, equatorial staphylomas, microphthalmia, cortical cataracts, lens luxation, spherophakia, iris coloboma, and blue irides. An autosomal dominant mode of inheritance is suspected. The hearing loss is attributable to cochlea-saccular degeneration.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when

sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion and ectropion often occur together in this breed, associated with an abnormally large palpebral fissure.

D. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

G. Prolapsed gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

Great Danes were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 83% of the prolapsed glands in Great Danes occurred before 1 year of age. Great Danes were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

H. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs. In

the Great Dane, pigmented cysts may also arise from pigmented epithelial cells of the ciliary body. Ciliary body cysts may predispose to glaucoma in the Great Dane.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gwin RM, Wyman M, Lim DJ, et al. Multiple ocular defects associated with partial albinism and deafness in the dog. *J Am Anim Hosp Assoc*. 1981;17:401-408.
3. Wood JL, Lakhani KH, Mason IK, et al. Relationship of the degree of goniodysgenesis and other ocular measurements to glaucoma in Great Danes. *Am J Vet Res*. 2001;62:1493-1499. PMID: 11560283
4. Mazzucchelli S, Vaillant MD, Weverberg F, et al. Retrospective study of 155 cases of prolapse of the nictitating membrane gland in dogs. *Vet Rec*. 2012;170:443. PMID: 22472538
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OCULAR DISORDERS REPORT GREAT DANE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 7,284		2017-2021 2,724		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			25	0.3%	2	0.1%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			124	1.7%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			192	2.6%	116	4.3%	0	
22.000 ECTROPION, UNSPECIFIED			293	4.0%	109	4.0%	0	
25.110 DISTICHIASIS			394	5.4%	135	5.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			6	0.1%	3	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	1	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			152	2.1%	92	3.4%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			15	0.2%	12	0.4%	0	
CORNEA								
70.210 PANNUS			2	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			5	0.1%	2	0.1%	0	
70.700 CORNEAL DYSTROPHY			28	0.4%	8	0.3%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	1	0.0%	0	
93.110 IRIS HYPOPLASIA			7	0.1%	5	0.2%	0	
93.120 IRIS CYST			78	1.1%	31	1.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			18	0.2%	4	0.1%	0	
93.170 ANTERIOR CHAMBER CYST			12	0.2%	28	1.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			0	0.0%	2	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			74	1.0%	26	1.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			15	0.2%	3	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			8	0.1%	4	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			4	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			22	0.3%	23	0.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.0%	2	0.1%	0	
93.810 UVEAL MELANOMA			4	0.1%	1	0.0%	0	
95.120 CILIARY BODY CYST			8	0.1%	2	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	3	0.1%	0	
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			15	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			255	3.5%	91	3.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			41	0.6%	28	1.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			83	1.1%	34	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			22	0.3%	11	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			5	0.1%	2	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			29	0.4%	3	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			22	0.3%	8	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			36	0.5%	45	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			74	1.0%	28	1.0%	0	

OCULAR DISORDERS REPORT GREAT DANE

Year Examined: Total # Dogs:		1991-2016 7,284		2017-2021 2,724		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	161	2.2%	40	1.5%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	46	0.6%	18	0.7%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	20	0.3%	8	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	34	0.5%	11	0.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	28	0.4%	11	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	6	0.1%	6	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	9	0.1%	9	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	3	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	4	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	2	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.1%	2	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	52	0.7%	3	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	10	0.1%	5	0.2%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	699	9.6%	277	10.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	12	0.2%	14	0.5%	0	
110.135	PHPV/ PTVL	16	0.2%	2	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	15	0.2%	8	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	29	0.4%	8	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	23	0.3%	7	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.0%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	7	0.1%	1	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	2	0.0%	2	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	3	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	60	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	141	1.9%	22	0.8%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	105	1.4%	118	4.3%	0	
NORMAL							
.000	NORMAL GLOBE	5,696	78.2%	1,942	71.3%	0	

GREAT PYRENEES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	2-4	Breeder option	Mutation in the <i>BEST1</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities.

despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967. PMID: 17460247
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OCULAR DISORDERS REPORT GREAT PYRENEES

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,264		2017-2021 124		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			2	0.2%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			3	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			15	1.2%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.2%	0	0.0%	0	
25.110 DISTICHIASIS			16	1.3%	0	0.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			14	1.1%	3	2.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.2%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.1%	0	0.0%	0	
93.120 IRIS CYST			6	0.5%	1	0.8%	0	
93.150 IRIS COLOBOMA			1	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	3	2.4%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			314	24.8%	30	24.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			11	0.9%	2	1.6%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			7	0.6%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.2%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.8%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.2%	0	0.0%	0	
97.120 COLOBOMA			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			53	4.2%	5	4.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			12	0.9%	2	1.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			14	1.1%	1	0.8%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			7	0.6%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	0.3%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	1	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			25	2.0%	2	1.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			20	1.6%	3	2.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			20	1.6%	6	4.8%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.5%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			5	0.4%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.8%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.8%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.8%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.8%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.4%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT GREAT PYRENEES

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,264		2017-2021 124		2021 0	
			#	%	#	%	#	%
LENS Continued 100.345 SIGNIFICANT CATARACTS (SUMMARY)			129	10.2%	19	15.3%	0	
VITREOUS 110.135 PHPV/ PTVL			1	0.1%	0	0.0%	0	
RETINA 120.170 RETINAL DYSPLASIA, FOLDS			9	0.7%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			15	1.2%	1	0.8%	0	
120.190 RETINAL DYSPLASIA, DETACHED			2	0.2%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			5	0.4%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			4	0.3%	0	0.0%	0	
120.960 RETINOPATHY			7	0.6%	5	4.0%	0	
120.970 CMR/ CMR-LIKE RETINOPATY			0	0.0%	1	0.8%	0	
OPTIC NERVE 130.110 MICROPAPILLA			6	0.5%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA			5	0.4%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			2	0.2%	0	0.0%	0	
OTHER 900.000 OTHER, UNSPECIFIED			7	0.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			35	2.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			18	1.4%	1	0.8%	0	
NORMAL .000 NORMAL GLOBE			837	66.2%	72	58.1%	0	

GREATER SWISS MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT GREATER SWISS MOUNTAIN DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,173		2017-2021 683		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			20	0.6%	3	0.4%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			1,045	32.9%	153	22.4%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			5	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			13	0.4%	2	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			5	0.2%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			105	3.3%	23	3.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			6	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	1	0.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			278	8.8%	39	5.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			75	2.4%	23	3.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			57	1.8%	15	2.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			36	1.1%	6	0.9%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			7	0.2%	1	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			11	0.3%	6	0.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.2%	5	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			16	0.5%	13	1.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			59	1.9%	18	2.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			88	2.8%	29	4.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			73	2.3%	21	3.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			13	0.4%	3	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			9	0.3%	1	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			11	0.3%	2	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.1%	2	0.3%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	6	0.9%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	5	0.7%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.1%	3	0.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			480	15.1%	160	23.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			10	0.3%	6	0.9%	0	

OCULAR DISORDERS REPORT GREATER SWISS MOUNTAIN DOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 3,173		2017-2021 683		2021 0	
		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	4	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	17	0.5%	4	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	7	0.2%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	2	0.3%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	7	0.2%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	5	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	29	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	71	2.2%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	31	1.0%	18	2.6%	0	
NORMAL							
.000	NORMAL GLOBE	1,840	58.0%	400	58.6%	0	

GREENLAND DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GREENLAND DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT GREENLAND DOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 90.250 PIGMENTARY UVEITIS		0		1	50.0%	0	
NORMAL .000 NORMAL GLOBE		0		1	50.0%	0	

GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Chronic superficial keratitis/pannus	Not defined	1, 2	NO
B.	Cataract	Not defined	1	NO

Description and Comments

A. Chronic superficial keratitis/Pannus

A bilateral disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Peiffer RL, Jr., Gelatt KN, Gwin RM. Chronic superficial keratitis. *Vet Med Small Anim Clin.* 1977;72:35-37. PMID: 584092

OCULAR DISORDERS REPORT GREYHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 682		2017-2021 132		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			2	0.3%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.1%	0	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	2	1.5%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.3%	0	0.0%	0	
CORNEA								
70.210 PANNUS			21	3.1%	1	0.8%	0	
70.700 CORNEAL DYSTROPHY			5	0.7%	1	0.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	0.3%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.3%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			21	3.1%	12	9.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			6	0.9%	1	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	0.6%	1	0.8%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	2	1.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.3%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.3%	4	3.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.3%	3	2.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			6	0.9%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			10	1.5%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			6	0.9%	1	0.8%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.3%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			47	6.9%	12	9.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.3%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	0.4%	1	0.8%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			13	1.9%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.4%	4	3.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	1	0.8%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			6	0.9%	1	0.8%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			2	0.3%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA			2	0.3%	0	0.0%	0	

OCULAR DISORDERS REPORT GREYHOUND

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	682		132		0	
		#	%	#	%	#	%
OTHER							
900.000	OTHER, UNSPECIFIED	8	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	14	2.1%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	4.3%	8	6.1%	0	
NORMAL							
.000	NORMAL GLOBE	556	81.5%	104	78.8%	0	

HANOVERIAN HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HANOVERIAN HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT HANOVERIAN HOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	25	100.0%	0	

HARRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HARRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT HARRIER

Year Examined: Total # Dogs:		1991-2016 411		2017-2021 33		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0	
25.110	DISTICHIASIS	2	0.5%	0	0.0%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	3.0%	0	
CORNEA							
70.210	PANNUS	1	0.2%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	1	0.2%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	2.9%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.2%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	
FUNDUS							
97.120	COLOBOMA	1	0.2%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	1.9%	1	3.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.5%	1	3.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	1.0%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.7%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.2%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	12	2.9%	1	3.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	1	3.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.7%	0	0.0%	0	
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	1	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	2	0.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	11	2.7%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	1.2%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	378	92.0%	30	90.9%	0	

HAVANA SILK DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT HAVANA SILK DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 628		2017-2021 88		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			31	4.9%	4	4.5%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.3%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			9	1.4%	1	1.1%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			33	5.3%	3	3.4%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.2%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.2%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			11	1.8%	1	1.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	0.5%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.3%	1	1.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	0.3%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			3	0.5%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.6%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			3	0.5%	4	4.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.3%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			22	3.5%	5	5.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.3%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	0.5%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			3	0.5%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			7	1.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			1	0.2%	0	0.0%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			6	1.0%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			548	87.3%	79	89.8%	0	

HAVANESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1, 2	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

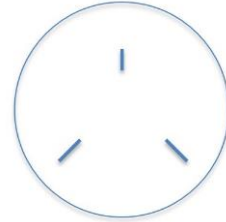
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Starr AN, Famula TR, Markward NJ, et al. Hereditary evaluation of multiple developmental abnormalities in the Havanese dog breed. *J Hered.* 2007;98:510-517. PMID: 17621585

OCULAR DISORDERS REPORT HAVANESE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 28,952		2017-2021 5,767		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			6	0.0%	1	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			10	0.0%	2	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			18	0.1%	3	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			4	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			1,441	5.0%	285	4.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			9	0.0%	4	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			9	0.0%	1	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			132	0.5%	30	0.5%	0	
CORNEA								
70.210 PANNUS			1	0.0%	1	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.0%	3	0.1%	0	
70.700 CORNEAL DYSTROPHY			116	0.4%	35	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.0%	2	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			1	0.0%	1	0.0%	0	
93.120 IRIS CYST			4	0.0%	1	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			3	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	2	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1,779	6.1%	302	5.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			28	0.1%	5	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			14	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			18	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			33	0.1%	27	0.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.0%	2	0.0%	0	
93.810 UVEAL MELANOMA			3	0.0%	1	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	0	0.0%	0	
97.120 COLOBOMA			4	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			22	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,679	5.8%	344	6.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			226	0.8%	99	1.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			137	0.5%	60	1.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			52	0.2%	13	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			44	0.2%	21	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			391	1.4%	186	3.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			26	0.1%	12	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			93	0.3%	59	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			127	0.4%	28	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			227	0.8%	48	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			49	0.2%	20	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			16	0.1%	3	0.1%	0	

OCULAR DISORDERS REPORT HAVANESE

Year Examined: Total # Dogs:		1991-2016 28,952		2017-2021 5,767		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	101	0.3%	18	0.3%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	21	0.1%	2	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	51	0.2%	19	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.0%	5	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	13	0.0%	9	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	5	0.0%	3	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	2	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	196	0.7%	260	4.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	123	0.4%	7	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	3	0.0%	2	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	12	0.0%	2	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,932	6.7%	877	15.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	30	0.1%	4	0.1%	0	
110.135	PHPV/ PTVL	3	0.0%	2	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	53	0.2%	21	0.4%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	473	1.6%	78	1.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	140	0.5%	11	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	24	0.1%	5	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	107	0.4%	6	0.1%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	12	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	3	0.1%	0	
120.960	RETINOPATHY	14	0.0%	11	0.2%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	7	0.0%	1	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	257	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	559	1.9%	11	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	248	0.9%	187	3.2%	0	
NORMAL							
.000	NORMAL GLOBE	23,918	82.6%	4,277	74.2%	0	

HOKKAIDO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Mizukami K, Chang H, Ota M, et al. Collie eye anomaly in Hokkaido dogs: case study. *Vet Ophthalmol.* 2012;15:128-32. PMID: 22051190

OCULAR DISORDERS REPORT HOKKAIDO KEN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2 # %		2017-2021 29 # %		2021 0 # %	
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	2	6.9%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	3.4%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	6	20.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			0	0.0%	1	3.4%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	3.4%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			0	0.0%	10	34.5%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	50.0%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	50.0%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	6	20.7%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	2	6.9%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	3.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			0	0.0%	1	3.4%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	50.0%	10	34.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	2	6.9%	0	
OTHER								
900.100 OTHER, NOT INHERITED			1	50.0%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			0	0.0%	11	37.9%	0	

HOVAWART

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HOVAWART breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT HOVAWART

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	32		33		0	
			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		1	3.1%	1	3.0%	0	
UVEA								
93.120	IRIS CYST		0	0.0%	2	6.1%	0	
93.170	ANTERIOR CHAMBER CYST		1	3.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		2	6.3%	2	6.1%	0	
95.120	CILIARY BODY CYST		0	0.0%	1	3.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	3.1%	2	6.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	3.1%	1	3.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		1	3.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	1	3.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		1	3.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		0	0.0%	1	3.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	1	3.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES		0	0.0%	1	3.0%	0	
100.328	Y-SUTURE TIP OPACITIES		0	0.0%	1	3.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		3	9.4%	6	18.2%	0	
VITREOUS								
110.320	VITREOUS DEGENERATION SYNERESIS		1	3.1%	0	0.0%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		0	0.0%	1	3.0%	0	
130.150	OPTIC DISC COLOBOMA		0	0.0%	1	3.0%	0	
OTHER								
900.100	OTHER, NOT INHERITED		0	0.0%	1	3.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	3.1%	1	3.0%	0	
NORMAL								
.000	NORMAL GLOBE		25	78.1%	24	72.7%	0	

IBIZAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT IBIZAN HOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,403		2017-2021 531		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.3%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASt			4	0.3%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.1%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.1%	1	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			9	0.6%	2	0.4%	0	
UVEA								
93.120 IRIS CYST			3	0.2%	1	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.1%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			165	11.8%	56	10.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.1%	1	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			13	0.9%	10	1.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.4%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			82	5.8%	27	5.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	0.6%	9	1.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.1%	4	0.8%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.2%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	5	0.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			10	0.7%	10	1.9%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			6	0.4%	4	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			6	0.4%	3	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	0.6%	4	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.4%	2	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			27	1.9%	9	1.7%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	1	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.2%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	7	1.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			93	6.6%	61	11.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.2%	3	0.6%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			5	0.4%	2	0.4%	0	

OCULAR DISORDERS REPORT IBIZAN HOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 1,403		2017-2021 531		2021 0	
		#	%	#	%	#	%
VITREOUS Continued							
110.320	VITREOUS DEGENERATION SYNERESIS	11	0.8%	1	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	11	0.8%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.3%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	
120.960	RETINOPATHY	1	0.1%	0	0.0%	0	
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	3	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	24	1.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	20	1.4%	1	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	1.4%	13	2.4%	0	
NORMAL							
.000	NORMAL GLOBE	1,120	79.8%	402	75.7%	0	

ICELANDIC SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT ICELANDIC SHEEPDOG

Year Examined: Total # Dogs:		1991-2016 2,085		2017-2021 914		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	0.2%	0	0.0%	0	
25.110	DISTICHIASIS	18	0.9%	7	0.8%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.1%	0	
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.1%	0	
CORNEA							
70.210	PANNUS	0	0.0%	2	0.2%	0	
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	9	0.4%	0	0.0%	0	
UVEA							
93.110	IRIS HYPOPLASIA	2	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	109	5.2%	25	2.7%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	2	0.2%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	53	2.5%	36	3.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	12	0.6%	9	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.4%	1	0.1%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.0%	2	0.2%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	2	0.2%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	15	0.7%	4	0.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.1%	4	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.3%	15	1.6%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.1%	1	0.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	14	0.7%	1	0.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.2%	1	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.4%	1	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	5	0.5%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.1%	3	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	3	0.3%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.1%	1	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.3%	5	0.5%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	90	4.3%	60	6.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.2%	1	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	0.4%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	3	0.3%	0	
120.960	RETINOPATHY	0	0.0%	3	0.3%	0	
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT ICELANDIC SHEEPDOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,085		914		0	
			#	%	#	%	#	%
OTHER								
900.000 OTHER, UNSPECIFIED			25	1.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			31	1.5%	1	0.1%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			34	1.6%	47	5.1%	0	
NORMAL								
.000 NORMAL GLOBE			1,892	90.7%	788	86.2%	0	

IRISH RED AND WHITE SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy - rod-cone dysplasia, type 1 (<i>rcd1</i>)	Autosomal recessive	2-21	NO	Mutation of the <i>PDE6B</i> gene
B.	Retinal atrophy - rod-cone dysplasia, type 4 (<i>rcd4</i>)	Autosomal recessive	22	NO	mutation of the <i>C2orf71</i> gene
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters and Irish Red and White Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

B. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

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OCULAR DISORDERS REPORT

IRISH RED & WHITE SETTER

Year Examined: Total # Dogs:		1991-2016 506		2017-2021 187		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0	
25.110	DISTICHIASIS	23	4.5%	1	0.5%	0	
CORNEA							
70.210	PANNUS	2	0.4%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	1	0.2%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.2%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	2	0.4%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	1.4%	1	0.5%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	2	1.1%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	
95.120	CILIARY BODY CYST	1	0.2%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	4.0%	10	5.3%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	1.0%	5	2.7%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	1.2%	4	2.1%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.4%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.5%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.6%	4	2.1%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	5	1.0%	1	0.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	7	1.4%	2	1.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	2	1.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.4%	2	1.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.2%	2	1.1%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.2%	1	0.5%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	1	0.5%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.5%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.2%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.2%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	36	7.1%	26	13.9%	0	
VITREOUS							
110.135	PHPV/ PTVL	1	0.2%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.8%	2	1.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.8%	1	0.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.4%	1	0.5%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.6%	1	0.5%	0	
120.960	RETINOPATHY	1	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	5	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	7	1.4%	1	0.5%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	3.4%	16	8.6%	0	
NORMAL							
.000	NORMAL GLOBE	424	83.8%	150	80.2%	0	

IRISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal atrophy - generalized	Presumed autosomal recessive	1, 2-23	NO	
G.	Retinal atrophy - rod-cone dysplasia, type 1 (<i>rcd1</i>)	Autosomal recessive	1, 2-21	NO	Mutation of the <i>PDE6B</i> gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (<i>rcd4</i>)	Autosomal recessive	25	NO	Mutation of the <i>C2orf71</i> gene
I.	Amblyopia with quadriplegia	Autosomal recessive	24-25	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Irish Setter, the entropion usually involves the lower eyelids.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Irish Setter, a later form of progressive retinal atrophy has been observed by several ophthalmologists at 4-5 years of age. Cases seen in this category appear to advance more rapidly than those with rod-cone dysplasia.

G. Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24

days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

H. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Amblyopia with quadriplegia

A congenital quadriplegia and amblyopia. The main symptoms include inability to stand or walk, amblyopia, tremor, nystagmus and possible seizures. Pathologic lesions are confined to the cerebellum. The condition was shown to be due to a fully penetrant autosomal recessive gene that is post-natally lethal in the homozygote.

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2. Hodgman SSea. Progressive retinal atrophy in dogs. The disease of Irish Setters (*rcd*). *Vet Rec.* 1949;61:185-189.
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25. Palmer AC, Payne JE, Wallace ME. Hereditary quadriplegia and amblyopia in the Irish Setter. *J Small Anim Pract.* 1973;14:343-352. PMID: 4803922

OCULAR DISORDERS REPORT IRISH SETTER

Year Examined: Total # Dogs:		1991-2016 2,126		2017-2021 227		2021 0	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	
20.160	MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	54	2.5%	2	0.9%	0	
22.000	ECTROPION, UNSPECIFIED	9	0.4%	0	0.0%	0	
25.110	DISTICHIASIS	118	5.6%	12	5.3%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.4%	0	
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.1%	0	0.0%	0	
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	6	0.3%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	2	0.1%	2	0.9%	0	
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.1%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	88	4.1%	16	7.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.3%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.3%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	27	1.3%	10	4.4%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	1	0.4%	0	
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	
95.120	CILIARY BODY CYST	0	0.0%	1	0.4%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	31	1.5%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	107	5.0%	7	3.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	12	0.6%	7	3.1%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	18	0.8%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.2%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	16	0.8%	2	0.9%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	22	1.0%	2	0.9%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	20	0.9%	1	0.4%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.2%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.2%	1	0.4%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.4%	1	0.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	7	0.3%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.4%	0	

OCULAR DISORDERS REPORT IRISH SETTER

	Year Examined: Total # Dogs:	1991-2016 2,126		2017-2021 227		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES		1	0.0%	1	0.4%	0	
100.328 Y-SUTURE TIP OPACITIES		0	0.0%	1	0.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT		18	0.8%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT		1	0.0%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED		1	0.0%	0	0.0%	0	
<i>100.345 SIGNIFICANT CATARACTS (SUMMARY)</i>		<i>180</i>	<i>8.5%</i>	<i>18</i>	<i>7.9%</i>	<i>0</i>	
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT		24	1.1%	4	1.8%	0	
110.135 PHPV/ PTVL		10	0.5%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS		4	0.2%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		10	0.5%	3	1.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		1	0.0%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		18	0.8%	2	0.9%	0	
120.960 RETINOPATHY		0	0.0%	1	0.4%	0	
OPTIC NERVE							
130.120 OPTIC NERVE HYPOPLASIA		4	0.2%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA		1	0.0%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		19	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		38	1.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		42	2.0%	12	5.3%	0	
NORMAL							
.000 NORMAL GLOBE		1,622	76.3%	163	71.8%	0	

IRISH TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the IRISH TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT IRISH TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	1.1%	1	2.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	1	2.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	1.1%	1	2.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	1.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	2.2%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	8.0%	8	17.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	1	2.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	2.3%	5	10.9%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	2	4.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	2.3%	2	4.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	2.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	1.1%	2	4.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	2.3%	1	2.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	1.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			8	9.1%	14	30.4%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	3.4%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			1	1.1%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	2	4.3%	0	
NORMAL								
.000 NORMAL GLOBE			75	85.2%	30	65.2%	0	

IRISH WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report

OCULAR DISORDERS REPORT IRISH WATER SPANIEL

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,135		197		0	
			#	%	#	%	#	%
EYELIDS								
20.140	ECTOPIC CILIA		1	0.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED		10	0.9%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED		3	0.3%	0	0.0%	0	
25.110	DISTICHIASIS		289	25.5%	49	24.9%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		4	0.4%	5	2.5%	0	
UVEA								
93.120	IRIS CYST		2	0.2%	1	0.5%	0	
93.150	IRIS COLOBOMA		1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		49	4.3%	14	7.1%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		2	0.2%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		3	0.3%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		1	0.1%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		3	0.3%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		105	9.3%	19	9.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		28	2.5%	13	6.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		12	1.1%	6	3.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		8	0.7%	1	0.5%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		2	0.2%	1	0.5%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		3	0.3%	1	0.5%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		3	0.3%	2	1.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		4	0.4%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		15	1.3%	1	0.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		23	2.0%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		10	0.9%	1	0.5%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		2	0.2%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		2	0.2%	1	0.5%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		6	0.5%	1	0.5%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		5	0.4%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		1	0.1%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS		1	0.1%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES		1	0.1%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		130	11.5%	28	14.2%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		2	0.2%	3	1.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		2	0.2%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		5	0.4%	1	0.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		5	0.4%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS		0	0.0%	2	1.0%	0	
120.960	RETINOPATHY		2	0.2%	1	0.5%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		20	1.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		15	1.3%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		14	1.2%	6	3.0%	0	

OCULAR DISORDERS REPORT

IRISH WATER SPANIEL

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,135		197		0	
			#	%	#	%	#	%
NORMAL								
.000 NORMAL GLOBE			767	67.6%	111	56.3%	0	

IRISH WOLFHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Uveal cysts	Not defined	1	Breeder option
F.	Cataract	Not defined	1	NO
G.	Retinal dysplasia - folds	Not defined	1	Breeder option
H.	Optic nerve hypoplasia	Not defined	1	NO
I.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

I. Micropapilla

A congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT IRISH WOLFHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,929		2017-2021 535		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			6	0.3%	0	0.0%	0	
25.110 DISTICHIASIS			95	4.9%	30	5.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.2%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.1%	0	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			19	1.0%	6	1.1%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			38	2.0%	3	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			90	4.7%	19	3.6%	0	
93.170 ANTERIOR CHAMBER CYST			11	0.6%	26	4.9%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			21	1.1%	9	1.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.4%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			11	0.6%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.3%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			5	0.3%	1	0.2%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			12	0.6%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			87	4.5%	38	7.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			15	0.8%	2	0.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			28	1.5%	5	0.9%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			5	0.3%	3	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			10	0.5%	3	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			9	0.5%	9	1.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			11	0.6%	7	1.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			13	0.7%	8	1.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			38	2.0%	8	1.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.4%	7	1.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	0.7%	2	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			10	0.5%	6	1.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.2%	11	2.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			3	0.2%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.2%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.2%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	1	0.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			190	9.8%	74	13.8%	0	

OCULAR DISORDERS REPORT IRISH WOLFHOUND

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,929		535		0	
		#	%	#	%	#	%	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	6	0.3%	1	0.2%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	6	0.3%	3	0.6%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	28	1.5%	6	1.1%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	11	0.6%	0	0.0%	0		
120.190	RETINAL DYSPLASIA, DETACHED	2	0.1%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.1%	0	0.0%	0		
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0		
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0		
120.960	RETINOPATHY	1	0.1%	1	0.2%	0		
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.2%	0		
OPTIC NERVE								
130.110	MICROPAPILLA	12	0.6%	7	1.3%	0		
130.120	OPTIC NERVE HYPOPLASIA	29	1.5%	3	0.6%	0		
130.150	OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	22	1.1%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	59	3.1%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	46	2.4%	25	4.7%	0		
NORMAL								
.000	NORMAL GLOBE	1,459	75.6%	372	69.5%	0		

ITALIAN GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Vitreous degeneration				
	- syneresis	Not defined	1, 2	Breeder option	
	- anterior chamber	Not defined	1, 2	Breeder option	
C.	Retinal atrophy (<i>IG-PRA1</i>)	Autosomal recessive	1, 3	NO	A genetic test for susceptibility is available

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Italian Greyhound, posterior subcapsular and cortical cataracts at two to three years of age appear to be the more common location of occurrence, with progression noted in an undetermined percentage of dogs.

B. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

C. Retinal atrophy - *IG-PRA1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Italian Greyhound PRA (*IG-PRA1*) is considered a "late onset" PRA with clinical signs detected between 3-5 years of age. Dogs initially lose night vision followed by decreased vision in bright light conditions. Clinically increases in tapetal reflectivity and retinal vessel attenuation are noted. The risk allele is known, but the genetic mutation has not been determined. The disease has been presumed to be inherited as an autosomal recessive trait. However some affected dogs had only one copy of the risk allele suggesting an

autosomal dominant with incomplete penetrance mode of inheritance. A DNA test is available for the risk allele. At least one other form of PRA appears to be present in the breed and will not be detected with this test.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Krishnan, H., et al. (2020). "Vitreous degeneration and associated ocular abnormalities in the dog." Vet Ophthalmol 23(2): 219-224. PMID: 31464365
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OCULAR DISORDERS REPORT ITALIAN GREYHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 7,736		2017-2021 590		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.0%	1	0.2%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.2%	0	
25.110 DISTICHIASIS			22	0.3%	1	0.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			3	0.0%	6	1.0%	0	
CORNEA								
70.210 PANNUS			7	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			19	0.2%	2	0.3%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			2	0.0%	1	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			3	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			6	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			52	0.7%	3	0.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			5	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.1%	2	0.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			22	0.3%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			17	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			340	4.4%	30	5.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			112	1.4%	25	4.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			95	1.2%	4	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			31	0.4%	8	1.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			6	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			19	0.2%	1	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			9	0.1%	2	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.2%	5	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			176	2.3%	14	2.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			179	2.3%	11	1.9%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			104	1.3%	7	1.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	1	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			16	0.2%	2	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			16	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			18	0.2%	2	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			11	0.1%	2	0.3%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			9	0.1%	7	1.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			3	0.0%	2	0.3%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.2%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.0%	1	0.2%	0	

OCULAR DISORDERS REPORT ITALIAN GREYHOUND

Year Examined: Total # Dogs:		1991-2016 7,736		2017-2021 590		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.330	GENERALIZED/ COMPLETE CATARACT	49	0.6%	2	0.3%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	36	0.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		897	11.6%	98	16.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	22	0.3%	2	0.3%	0	
110.135	PHPV/ PTVL	3	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1,036	13.4%	113	19.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	1,688	21.8%	87	14.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	25	0.3%	2	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.2%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	247	3.2%	8	1.4%	0	
120.400	RETINAL HEMORRHAGE	19	0.2%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	2	0.3%	0	
120.960	RETINOPATHY	7	0.1%	2	0.3%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	20	0.3%	3	0.5%	0	
130.120	OPTIC NERVE HYPOPLASIA	34	0.4%	3	0.5%	0	
130.150	OPTIC DISC COLOBOMA	4	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	63	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	138	1.8%	5	0.8%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	99	1.3%	28	4.7%	0	
NORMAL							
.000	NORMAL GLOBE	5,063	65.4%	359	60.8%	0	

JACK RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	1, 2-7	NO	Mutation of the <i>ADAMTS17</i> gene
E.	Vitreous degeneration	Not defined	1, 2	Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 8	NO	Mutation of the <i>prcd</i> gene
G.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	8	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea,

iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal Atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Jack Russell Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve

(coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Lawson DD. Luxation of the crystalline lens in the dog. *J Small Anim Pract.* 1969;10:461-463. PMID: 5387868
3. Curtis R, Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract.* 1980;21:657-668. PMID: 6969820
4. Curtis R, Barnett KC, Lewis SJ. Clinical and pathological observations concerning the aetiology of primary lens luxation in the dog. *Vet Rec.* 1983;112:238-246. PMID: 6601878
5. Oberbauer AM, Hollingsworth SR, Belanger JM, et al. Inheritance of cataracts and primary lens luxation in Jack Russell Terriers. *Am J Vet Res.* 2008;69:222-227. PMID: 18241019
6. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci.* 2010;51:4716-4721. PMID: 20375329
7. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384. PMID: 22050825
8. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet.* 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet.* 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT

JACK RUSSELL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 15,707		2017-2021 1,571		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			5	0.0%	0	0.0%	0	
10.000 GLAUCOMA			3	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			3	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			363	2.3%	24	1.5%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	1	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	1	0.1%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			9	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			60	0.4%	9	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			10	0.1%	1	0.1%	0	
UVEA								
93.120 IRIS CYST			5	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			4	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			717	4.6%	68	4.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			40	0.3%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			18	0.1%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			10	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			12	0.1%	9	0.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			6	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.0%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			542	3.5%	52	3.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			89	0.6%	29	1.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			85	0.5%	16	1.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			23	0.1%	5	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			15	0.1%	1	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			61	0.4%	12	0.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			28	0.2%	12	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			22	0.1%	6	0.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			190	1.2%	13	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			380	2.4%	34	2.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			66	0.4%	9	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			139	0.9%	13	0.8%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			31	0.2%	2	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			27	0.2%	3	0.2%	0	

OCULAR DISORDERS REPORT JACK RUSSELL TERRIER

Year Examined: Total # Dogs:		1991-2016 15,707		2017-2021 1,571		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	6	0.0%	9	0.6%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	8	0.1%	7	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	95	0.6%	3	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	81	0.5%	2	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,281	8.2%	178	11.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	18	0.1%	3	0.2%	0	
110.135	PHPV/ PTVL	4	0.0%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	25	0.2%	4	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	210	1.3%	16	1.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	58	0.4%	3	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	20	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	85	0.5%	2	0.1%	0	
120.400	RETINAL HEMORRHAGE	4	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	
120.960	RETINOPATHY	2	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	7	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	12	0.1%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	113	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	645	4.1%	4	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	130	0.8%	69	4.4%	0	
NORMAL							
.000	NORMAL GLOBE	12,982	82.7%	1,257	80.0%	0	

JAGDTERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation of the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Jagdterrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384. PMID: 22050825

OCULAR DISORDERS REPORT JAGDTERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		2	100.0%	0	

JAMTHUND

(Swedish Elkhound)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Jamthund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Jamthund. The conditions listed above are currently noted solely due to the availability of a genetic test for the disease.

1. Hertel E, Bergström T, Kell U, Karlstam L, Ekman S, Ekestén B. Retinal degeneration in nine Swedish Jämthund dogs. Vet Ophthalmol. 2010 Mar;13(2):110-6. doi: 10.1111/j.1463-5224.2010.00761.x. PMID: 20447030.

OCULAR DISORDERS REPORT JAMTHUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		1	100.0%	0	

JAPANESE AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT JAPANESE AKITA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	6	3.1%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	6	3.1%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			4	5.0%	26	13.5%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.5%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	5.0%	13	6.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	1.3%	1	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	2.5%	1	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	3.8%	5	2.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	2	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	4	2.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	6	3.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.5%	0	
100.328 Y-SUTURE TIP OPACITIES			2	2.5%	8	4.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			8	10.0%	30	15.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	7	3.6%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	1.3%	1	0.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	1.3%	3	1.6%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	1.3%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	2	1.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			3	3.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	5.0%	20	10.4%	0	
NORMAL								
.000 NORMAL GLOBE			62	77.5%	125	64.8%	0	

JAPANESE CHIN (JAPANESE SPANIEL)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and

macropalpebral fissure.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Japanese Chin is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirman J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT JAPANESE CHIN

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,191		283		0	
			#	%	#	%	#	%
EYELIDS								
20.160	MACROPALPEBRAL FISSURE		13	1.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED		88	7.4%	28	9.9%	0	
22.000	ECTROPION, UNSPECIFIED		1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS		56	4.7%	11	3.9%	0	
NASOLACRIMAL								
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM		1	0.1%	0	0.0%	0	
40.910	KERATOCONJUNCTIVITIS SICCA		1	0.1%	2	0.7%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		2	0.2%	0	0.0%	0	
CORNEA								
70.210	PANNUS		9	0.8%	2	0.7%	0	
70.220	PIGMENTARY KERATITIS		46	3.9%	9	3.2%	0	
70.700	CORNEAL DYSTROPHY		3	0.3%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		3	0.3%	1	0.4%	0	
UVEA								
93.150	IRIS COLOBOMA		1	0.1%	1	0.4%	0	
93.170	ANTERIOR CHAMBER CYST		1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		124	10.4%	25	8.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		6	0.5%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		7	0.6%	1	0.4%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS		6	0.5%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		1	0.1%	0	0.0%	0	
FUNDUS								
97.120	COLOBOMA		1	0.1%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		1	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		56	4.7%	12	4.2%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		21	1.8%	7	2.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		11	0.9%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		8	0.7%	2	0.7%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		5	0.4%	3	1.1%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		4	0.3%	4	1.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		1	0.1%	1	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		4	0.3%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		42	3.5%	14	4.9%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		29	2.4%	3	1.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		25	2.1%	3	1.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		1	0.1%	1	0.4%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		8	0.7%	2	0.7%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		5	0.4%	2	0.7%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		11	0.9%	4	1.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		4	0.3%	4	1.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	2	0.7%	0	
100.328	Y-SUTURE TIP OPACITIES		1	0.1%	1	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		7	0.6%	1	0.4%	0	
100.340	RESORBING/ HYPERMATURE CATARACT		0	0.0%	1	0.4%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		6	0.5%	2	0.7%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		188	15.8%	55	19.4%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		15	1.3%	4	1.4%	0	

OCULAR DISORDERS REPORT JAPANESE CHIN

Year Examined: Total # Dogs:		1991-2016 1,191		2017-2021 283		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	13	1.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	10	0.8%	1	0.4%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	48	4.0%	15	5.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.2%	1	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	15	1.3%	1	0.4%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.1%	0	0.0%	0	
120.960	RETINOPATHY	0	0.0%	1	0.4%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.2%	1	0.4%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	28	2.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	45	3.8%	3	1.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	37	3.1%	26	9.2%	0	
NORMAL							
.000	NORMAL GLOBE	768	64.5%	138	48.8%	0	

JINDO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the JINDO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

JINDO

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	1	6.3%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	6.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX		1	16.7%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS		0	0.0%	1	6.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX		1	16.7%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES		0	0.0%	1	6.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		2	33.3%	2	12.5%	0	
NORMAL							
.000 NORMAL GLOBE		5	83.3%	14	87.5%	0	

KAI KEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT

KAI KEN

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		5		30		0	
			#	%	#	%	#	%
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	20.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	60.0%	9	30.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	2	6.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	3.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	3.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	1	3.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			0	0.0%	3	10.0%	0	
RETINA								
120.960 RETINOPATHY			0	0.0%	1	3.3%	0	
NORMAL								
.000 NORMAL GLOBE			2	40.0%	18	60.0%	0	

KARELIAN BEAR DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A genetic test is available to detect the progressive rod cone degeneration form of PRA caused by a mutation in the *prcd*-gene. A second form of PRA is also present in the Karelian Bear Dog for which the causative mutation is not yet known.

References

1. Ahonen S, Lohi H, editors. Progressive retinal atrophy in the Karelian Bear Dog: A large animal model for retinitis pigmentosa. ARVO Abstract 2014 Annual Meeting; 2014; Orlando, FL. Program number: 3270.

OCULAR DISORDERS REPORT KARELIAN BEAR DOG

Year Examined: Total # Dogs:		1991-2016 105		2017-2021 13		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	2	1.9%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	7.7%	0	
70.700	CORNEAL DYSTROPHY	4	3.8%	1	7.7%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	1.0%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	9.5%	2	15.4%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	2.9%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.0%	2	15.4%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	7.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	2	1.9%	0	0.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	2.9%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	3.8%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	7.7%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	7.7%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	1.0%	1	7.7%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	10	9.5%	4	30.8%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	3.8%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	1.0%	0	0.0%	0	
120.960	RETINOPATHY	1	1.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	1	1.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.0%	2	15.4%	0	
NORMAL							
.000	NORMAL GLOBE	80	76.2%	6	46.2%	0	

KEESHOND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

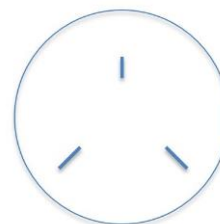
Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be

marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT KEESHOND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,317		2017-2021 630		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			1	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			9	0.3%	2	0.3%	0	
25.110 DISTICHIASIS			195	5.9%	19	3.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			12	0.4%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			2	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			30	0.9%	3	0.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.1%	1	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			18	0.5%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			296	8.9%	65	10.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			16	0.5%	6	1.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			21	0.6%	3	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			12	0.4%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			119	3.6%	54	8.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.2%	10	1.6%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.5%	11	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.2%	2	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			38	1.1%	2	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			9	0.3%	1	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			22	0.7%	11	1.7%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			14	0.4%	3	0.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			10	0.3%	2	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	1	0.2%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	1	0.2%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			58	1.7%	92	14.6%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.2%	1	0.2%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			0	0.0%	1	0.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			383	11.5%	204	32.4%	0	

OCULAR DISORDERS REPORT KEESHOND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 3,317		2017-2021 630		2021 0	
		#	%	#	%	#	%
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT		1	0.0%	2	0.3%	0	
110.320 VITREOUS DEGENERATION SYNERESIS		9	0.3%	2	0.3%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		6	0.2%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		2	0.1%	0	0.0%	0	
120.190 RETINAL DYSPLASIA, DETACHED		1	0.0%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		10	0.3%	1	0.2%	0	
120.400 RETINAL HEMORRHAGE		1	0.0%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		2	0.1%	0	0.0%	0	
120.960 RETINOPATHY		3	0.1%	2	0.3%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		7	0.2%	3	0.5%	0	
130.120 OPTIC NERVE HYPOPLASIA		12	0.4%	1	0.2%	0	
130.150 OPTIC DISC COLOBOMA		1	0.0%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		21	0.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		45	1.4%	3	0.5%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		31	0.9%	33	5.2%	0	
NORMAL							
.000 NORMAL GLOBE		2,660	80.2%	445	70.6%	0	

KERRY BLUE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the Kerry Blue Terrier breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT KERRY BLUE TERRIER

Year Examined: Total # Dogs:		1991-2016 742		2017-2021 104		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	12	1.6%	4	3.8%	0	
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	3	0.4%	2	1.9%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	1.5%	4	3.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.3%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	1	1.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.8%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	3.9%	2	1.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	2.2%	1	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.4%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	1.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.5%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	1	1.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.8%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	43	5.8%	4	3.8%	0	
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	7	0.9%	1	1.0%	0	
RETINA							
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	1	1.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	21	2.8%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	0.4%	3	2.9%	0	
NORMAL							
.000	NORMAL GLOBE	655	88.3%	87	83.7%	0	

KISHU-KEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KISHU-KEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

KISHU KEN

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	1	20.0%	0	
NORMAL .000 NORMAL GLOBE		2	100.0%	4	80.0%	0	

KOMONDOR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Appears to be relatively young age for onset in the Komondor (<4yr) and mainly anterior cortical.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the Komondor breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT KOMONDOR

Year Examined: Total # Dogs:		1991-2016 344		2017-2021 47		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.3%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED	1	0.3%	0	0.0%	0	
25.110	DISTICHIASIS	0	0.0%	1	2.1%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.3%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.3%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	1.5%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.6%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	14	4.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	27	7.8%	2	4.3%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.3%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.6%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	4	1.2%	1	2.1%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.9%	1	2.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.9%	1	2.1%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	1.5%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	1.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	5	1.5%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.3%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.3%	1	2.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.3%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	46	13.4%	4	8.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.3%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	7	2.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	6	1.7%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.3%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	280	81.4%	43	91.5%	0	

KOREAN POONGSAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KOREAN POONGSAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

KOREAN POONGSAN

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

KROMFORHLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KROMFORHLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

KROMFOHRLANDER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		4	100.0%	8	100.0%	0	

KUVASZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the form of PRA in the Kuvasz is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT

KUVASZ

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.4%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.2%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.2%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.4%	0	0.0%	0	
25.110 DISTICHIASIS			21	3.8%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.2%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			6	1.1%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.2%	0	0.0%	0	
UVEA								
93.150 IRIS COLOBOMA			2	0.4%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			23	4.2%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.5%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.5%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			15	2.7%	1	14.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	14.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.2%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.5%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.9%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			16	2.9%	1	14.3%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.2%	0	0.0%	0	
RETINA								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			4	0.7%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	0.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			12	2.2%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	0.5%	1	14.3%	0	
NORMAL								
.000 NORMAL GLOBE			460	83.9%	5	71.4%	0	

KYI-LEO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KYI-LEO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

KYI-LEO

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
RETINA 120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	50.0%	0		0	
NORMAL .000 NORMAL GLOBE			1	50.0%	0		0	

LABRADOR RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1-3	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy - epithelial/stromal - macular	Not defined Autosomal recessive	1, 4 5	Breeder option NO	Mutation of the <i>CHST6</i> gene
E.	Uveal cysts	Not defined	1	Breeder option	
F.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
G.	Cataract	Presumed dominant with incomplete penetrance Autosomal recessive Not defined	1-3, 6-8 9 1	NO NO NO	
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
J.	Vitreous degeneration	Not defined	1	Breeder option	
K.	Retinal atrophy				Mutation of the <i>prcd</i> gene
	- (<i>prcd</i>)	Autosomal recessive	1, 10-14	NO	
	- generalized		15	NO	Mutation of the <i>ABCA4</i> gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
L.	Achromatopsia Type 2 (ACHM - Type 2)	Autosomal recessive	16, 17	NO	Causative mutation not yet published
M.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 18-27	NO (Breeder option with Normal DNA test for folds)	Mutation in the COL9A3 gene
N.	Retinal dysplasia - folds/geographic/detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 18-26, 28	NO	Mutation in the COL9A3 gene
O.	Limbal melanoma	Not defined	29	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal/macular

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In Labrador Retrievers in Europe, macular corneal dystrophy (MCD) has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the *CHST6* gene.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Labrador Retriever, this is a potentially serious problem as many of the PPMs identified on routine screening examinations bridge from the iris to the cornea and/or from iris sheets bridging the pupils. These forms may cause vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

G. Cataract

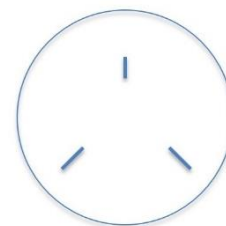
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most frequently reported cataracts in the Labrador Retriever are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts which usually present between 1-3 years of age. These are generally stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract.

H. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless misdiagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (**persistent hyaloid remnant**).

J. Vitreous degeneration

Liquefaction of the vitreous gel, which may predispose to retinal detachment.

K. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Labrador Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

L. Achromatopsia Type 2 (ACHM – Type 2)

A congenital form of day blindness. Visual deficits become apparent between 8-10 weeks of age. Normal vision is present in low light conditions. Clinical examination is normal. Cone responses are absent on an electroretinogram. The causative genetic mutation has been determined, but not yet published. A DNA test is available.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state described in "R" below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the COL9A3 mutation.

N. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of COL9A3. A DNA test is available.

O. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been noted in the German Shepherd, Labrador and Golden Retriever.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for Labrador Retriever. However as the condition is no longer identified in the breed, the condition has been removed.

Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT LABRADOR RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 238,354		2017-2021 38,309		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			61	0.0%	6	0.0%	0	
10.000 GLAUCOMA			28	0.0%	2	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			16	0.0%	2	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			86	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			1,029	0.4%	203	0.5%	0	
22.000 ECTROPION, UNSPECIFIED			500	0.2%	51	0.1%	0	
25.110 DISTICHIASIS			2,331	1.0%	377	1.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			25	0.0%	27	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			8	0.0%	3	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	2	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			11	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			38	0.0%	2	0.0%	0	
CORNEA								
70.210 PANNUS			9	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			19	0.0%	7	0.0%	0	
70.700 CORNEAL DYSTROPHY			2,346	1.0%	373	1.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			82	0.0%	9	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			2	0.0%	1	0.0%	0	
93.110 IRIS HYPOPLASIA			6	0.0%	1	0.0%	0	
93.120 IRIS CYST			362	0.2%	89	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			12	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			11	0.0%	1	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			36	0.0%	18	0.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			1	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			7,146	3.0%	1,391	3.6%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			148	0.1%	15	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			160	0.1%	7	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			176	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			348	0.1%	383	1.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			32	0.0%	9	0.0%	0	
93.810 UVEAL MELANOMA			57	0.0%	29	0.1%	0	
95.120 CILIARY BODY CYST			24	0.0%	18	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			14	0.0%	0	0.0%	0	
97.120 COLOBOMA			11	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			728	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			10,362	4.3%	1,765	4.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1,693	0.7%	957	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1,438	0.6%	246	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			244	0.1%	93	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			190	0.1%	65	0.2%	0	

OCULAR DISORDERS REPORT LABRADOR RETRIEVER

Year Examined: Total # Dogs:		1991-2016 238,354		2017-2021 38,309		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1,005	0.4%	394	1.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	310	0.1%	164	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	536	0.2%	337	0.9%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	769	0.3%	155	0.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1,978	0.8%	314	0.8%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	529	0.2%	119	0.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	66	0.0%	10	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	486	0.2%	84	0.2%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	340	0.1%	67	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	284	0.1%	137	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	18	0.0%	22	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	61	0.0%	55	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	19	0.0%	11	0.0%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	9	0.0%	12	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	14	0.0%	17	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	13	0.0%	16	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	273	0.1%	401	1.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	353	0.1%	9	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	3	0.0%	5	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	53	0.0%	6	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	11,360	4.8%	3,690	9.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	600	0.3%	134	0.3%	0	
110.135	PHPV/ PTVL	153	0.1%	15	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	41	0.0%	20	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	809	0.3%	177	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5,134	2.2%	384	1.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2,027	0.9%	176	0.5%	0	
120.190	RETINAL DYSPLASIA, DETACHED	185	0.1%	11	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	988	0.4%	19	0.0%	0	
120.400	RETINAL HEMORRHAGE	34	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	73	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	7	0.0%	8	0.0%	0	
120.960	RETINOPATHY	66	0.0%	39	0.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	105	0.0%	26	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	87	0.0%	5	0.0%	0	
130.150	OPTIC DISC COLOBOMA	44	0.0%	6	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1,697	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	4,326	1.8%	47	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2,271	1.0%	1,431	3.7%	0	
NORMAL							
.000	NORMAL GLOBE	204,910	86.0%	30,815	80.4%	0	

LAGOTTO ROMAGNOLO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lagotto Romagnolo is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

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OCULAR DISORDERS REPORT LAGOTTO ROMAGNOLO

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 361		2017-2021 1,174		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	1	0.1%	0	
EYELIDS								
25.110 DISTICHIAIS			33	9.1%	104	8.9%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.3%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.3%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	0.1%	0	
UVEA								
93.120 IRIS CYST			1	0.3%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			12	3.3%	92	7.8%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	0.8%	20	1.7%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	0.1%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			8	2.2%	33	2.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			4	1.1%	18	1.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.3%	6	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	1.1%	3	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	4	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.3%	8	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.3%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	6	0.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	6	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.6%	2	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	4	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.3%	2	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.3%	1	0.1%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	2	0.2%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	6	0.5%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			0	0.0%	1	0.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			16	4.4%	71	6.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	15	1.3%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			2	0.6%	4	0.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			0	0.0%	1	0.1%	0	
120.960 RETINOPATHY			0	0.0%	2	0.2%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			1	0.3%	5	0.4%	0	
130.150 OPTIC DISC COLOBOMA			0	0.0%	1	0.1%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	0.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			0	0.0%	2	0.2%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			8	2.2%	29	2.5%	0	

OCULAR DISORDERS REPORT LAGOTTO ROMAGNOLO

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			301	83.4%	889	75.7%	0	

LAKELAND TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder Option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation of the <i>ADAMTS17</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384. PMID: 22050825

OCULAR DISORDERS REPORT LAKELAND TERRIER

Year Examined: Total # Dogs:		1991-2016 236		2017-2021 46		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	9	3.8%	3	6.5%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.4%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.8%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	33	14.0%	6	13.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.8%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	1.7%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	3.4%	6	13.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	2.1%	1	2.2%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	4.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	1.3%	0	0.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	1.7%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	2.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	3	1.3%	1	2.2%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	11	4.7%	4	8.7%	0	
RETINA							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.4%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	2	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	6	2.5%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	180	76.3%	32	69.6%	0	

LANCASHIRE HEELER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membrane - iris to iris	Not defined	1	Breeder option	
B.	Lens luxation	Autosomal recessive	2-4	NO	Mutation of the <i>ADAMTS17</i> gene
C.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	5-7	NO	Deletion in the <i>NHEJ1</i> gene
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	8, 9	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

C. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve

(coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

D. Retinal Atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lancashire Heeler is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Sargan DR, Withers D, Pettitt L, et al. Mapping the mutation causing lens luxation in several terrier breeds. *J Hered.* 2007;98:534-538. PMID: 17573382
3. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci.* 2010;51:4716-4721. PMID: 20375329
4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384. PMID: 22050825
5. Bedford PG. Collie eye anomaly in the Lancashire Heeler. *Vet Rec.* 1998;143:354-356. PMID: 9800301
6. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res.* 2007;17:1562-1571. PMID: 17916641
7. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for Collie eye anomaly. *Genomics.* 2003;82:86-95. PMID: 12809679

8. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One*. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
9. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT LANCASHIRE HEELER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 143		2017-2021 48		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	0.7%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	2.1%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			58	40.6%	6	12.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.7%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	1.4%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	6	12.5%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.7%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.7%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.7%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	0.7%	0	0.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	1.4%	1	2.1%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	2.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	1.4%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.7%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.7%	0	0.0%	0	
OTHER								
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	4	8.3%	0	
NORMAL								
.000 NORMAL GLOBE			95	66.4%	32	66.7%	0	

LAPPONIAN HERDER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation of the <i>prcd</i> gene
B.	Multifocal retinopathy - <i>cmr3</i>	Autosomal recessive	3	NO	Mutation of the <i>BEST1</i> gene
C.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	4	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lapponian Herder is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Multifocal retinopathy (*cmr3*)

Canine Multifocal Retinopathy type 3 (*cmr3*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal

thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Clinically the disease is similar to that seen in the Bullmastiff and Coton deTulear, but the mutation in the Bestrophin 1 gene (*BEST1* alias *VMD2*) is different. The multifocal retinopathy seen in the Lapponian Herder is caused by a deletion at position 1,388 and a substitution at position 1,466 and is therefore called *cmr3*. A DNA test is available.

- C. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lapponian Herder. The conditions listed above are currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425
2. Kaukonen M, Pettinen IT, Wickström K, Arumilli M, Donner J, Juhola IJ, Holopainen S, Turunen JA, Yoshihara M, Kere J, Lohi H. A missense variant in IFT122 associated with a canine model of retinitis pigmentosa. *Hum Genet*. 2021 Nov;140(11):1569-1579. doi: 10.1007/s00439-021-02266-3. Epub 2021 Feb 19. PMID: 33606121
3. Zangerl B, Wickstrom K, Slavik J, et al. Assessment of canine BEST1 variations identifies new mutations and establishes an independent bestrophinopathy model (*cmr3*). *Mol Vis*. 2010;16:2791-2804. PMID: 21197113
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10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938.
PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT LAPPONIAN HERDER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0		1	33.3%	0	
NORMAL .000 NORMAL GLOBE		0		2	66.7%	0	

LARGE MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the LARGE MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT LARGE MUNSTERLANDER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		1	100.0%	0	

LEONBERGER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1, 2	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
E.	Uveal cysts	Not defined	1	Breeder option
F.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1	Breeder option Passes with no notation
G.	Cataract	Not defined	1	NO
H.	Retinal dysplasia – folds	Not defined	1	Breeder option

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds.

Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Heinrich CL, Lakhani KH, Featherstone HJ, et al. Cataract in the UK Leonberger population. *Vet Ophthalmol.* 2006 Sep-Oct;9:350-356. PMID: 15762923

OCULAR DISORDERS REPORT LEONBERGER

Year Examined: Total # Dogs:		1991-2016 1,948		2017-2021 708		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	35	1.8%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	64	3.3%	35	4.9%	0	
22.000	ECTROPION, UNSPECIFIED	28	1.4%	11	1.6%	0	
25.110	DISTICHIASIS	50	2.6%	12	1.7%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	27	1.4%	16	2.3%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	2	0.3%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	5	0.3%	0	0.0%	0	
UVEA							
93.110	IRIS HYPOPLASIA	1	0.1%	1	0.1%	0	
93.120	IRIS CYST	15	0.8%	5	0.7%	0	
93.170	ANTERIOR CHAMBER CYST	0	0.0%	5	0.7%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	420	21.6%	164	23.2%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	1	0.1%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.6%	8	1.1%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	1	0.1%	0	
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0	
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	159	8.2%	63	8.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	35	1.8%	28	4.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	30	1.5%	10	1.4%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.3%	1	0.1%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	11	0.6%	2	0.3%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	16	0.8%	6	0.8%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	15	0.8%	22	3.1%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	20	1.0%	23	3.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	0.5%	10	1.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	35	1.8%	6	0.8%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	1	0.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	5	0.3%	1	0.1%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.5%	4	0.6%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	21	1.1%	17	2.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.3%	7	1.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	2	0.3%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	7	0.4%	3	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	4	0.2%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.3%	2	0.3%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	234	12.0%	145	20.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	8	1.1%	0	

OCULAR DISORDERS REPORT LEONBERGER

Year Examined: Total # Dogs:		1991-2016 1,948		2017-2021 708		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	4	0.2%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.2%	2	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	0.5%	11	1.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.3%	0	0.0%	0	
120.960	RETINOPATHY	1	0.1%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	32	1.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	53	2.7%	2	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.3%	49	6.9%	0	
NORMAL							
.000	NORMAL GLOBE	1,264	64.9%	362	51.1%	0	

LHASA APSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	2	NO	
C.	Retinal atrophy (prcd)	Autosomal recessive	3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol.* 2005;8:101-111. PMID: 32894063

- 3 . Hitti-Malin RJ, Burmeister LM, Ricketts SL, Lewis TW, Pettitt L, Boursnell M, Schofield EC, Sargan D, Mellersh CS. A LINE-1 insertion situated in the promoter of IMPG2 is associated with autosomal recessive progressive retinal atrophy in Lhasa Apso dogs. *BMC Genet.* 2020 Sep 7;21(1):100. doi: 10.1186/s12863-020-00911-w. PMID: 32894063; PMCID: PMC7487703.

OCULAR DISORDERS REPORT LHASA APSO

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 817		2017-2021 115		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			3	0.4%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			12	1.5%	2	1.7%	0	
25.110 DISTICHIASIS			32	3.9%	3	2.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.4%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.5%	0	0.0%	0	
CORNEA								
70.210 PANNUS			8	1.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			21	2.6%	2	1.7%	0	
70.700 CORNEAL DYSTROPHY			16	2.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.1%	0	0.0%	0	
93.120 IRIS CYST			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			10	1.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	2	1.7%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			6	0.7%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			28	3.4%	1	0.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			7	0.9%	1	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			5	0.6%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.4%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.1%	1	0.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			13	1.6%	3	2.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			15	1.8%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			3	0.4%	1	0.9%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.5%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.4%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	2	1.7%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	1	0.9%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			18	2.2%	1	0.9%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			83	10.2%	10	8.7%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			4	0.5%	1	0.9%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			6	0.7%	1	0.9%	0	

OCULAR DISORDERS REPORT LHASA APSO

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	817		115		0	
		#	%	#	%	#	%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	0.6%	2	1.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	7	0.9%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	
OTHER							
900.100	OTHER, NOT INHERITED	12	1.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	2.6%	3	2.6%	0	
NORMAL							
.000	NORMAL GLOBE	628	76.9%	91	79.1%	0	

LLEWELLIN SETTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the LLEWELLIN SETTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT LLEWELLIN SETTER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		1 #	%	24 #	%	0 #	%
EYELIDS							
22.000 ECTROPION, UNSPECIFIED		0	0.0%	1	4.2%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	4.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX		0	0.0%	2	8.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	4.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	1	4.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS		0	0.0%	1	4.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX		0	0.0%	1	4.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX		0	0.0%	1	4.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES		0	0.0%	1	4.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	1	4.2%	0	
100.328 Y-SUTURE TIP OPACITIES		0	0.0%	3	12.5%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	12	50.0%	0	
OTHER							
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	4.2%	0	
NORMAL							
.000 NORMAL GLOBE		1	100.0%	15	62.5%	0	

LOUISIANA CATAHOULA LEOPARD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma and persistent pupillary membranes.

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT LOUISIANA CATAHOULA LEOPARD DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 388		2017-2021 82		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			5	1.3%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIAStS			3	0.8%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	1.2%	0	
70.700 CORNEAL DYSTROPHY			1	0.3%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			4	1.0%	1	1.2%	0	
93.150 IRIS COLOBOMA			12	3.1%	1	1.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			40	10.3%	10	12.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.3%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	1	1.2%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.3%	1	1.2%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.3%	1	1.2%	0	
97.120 COLOBOMA			2	0.5%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.3%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	1.3%	2	2.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	1	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.3%	2	2.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	1.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			4	1.0%	2	2.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			3	0.8%	1	1.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.5%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	1	1.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.3%	1	1.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			13	3.4%	10	12.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.5%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.5%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			9	2.3%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			2	0.5%	0	0.0%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			1	0.3%	0	0.0%	0	
OPTIC NERVE								
130.150 OPTIC DISC COLOBOMA			2	0.5%	4	4.9%	0	
OTHER								
900.100 OTHER, NOT INHERITED			4	1.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			12	3.1%	3	3.7%	0	
NORMAL								
.000 NORMAL GLOBE			317	81.7%	59	72.0%	0	

LOWCHEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Vitreous degeneration	Not defined	1	Breeder option
E.	Retinal atrophy - generalized	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT LOWCHEN

Year Examined: Total # Dogs:		1991-2016 1,730		2017-2021 454		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS	81	4.7%	29	6.4%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.2%	0	
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	1	0.1%	0	0.0%	0	
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST	1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	134	7.7%	55	12.1%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.2%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	1	0.2%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.4%	12	2.6%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	21	1.2%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	57	3.3%	13	2.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	11	0.6%	7	1.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	13	0.8%	1	0.2%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	3	0.7%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.5%	1	0.2%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.2%	1	0.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	21	1.2%	5	1.1%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	24	1.4%	3	0.7%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.4%	2	0.4%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.1%	1	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	1	0.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	16	0.9%	1	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	146	8.4%	27	5.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	3	0.7%	0	
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	49	2.8%	4	0.9%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT LOWCHEN

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,730		454		0	
			#	%	#	%	#	%
RETINA Continued								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		0	0.0%	1	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED		1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		38	2.2%	3	0.7%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		2	0.1%	0	0.0%	0	
120.960	RETINOPATHY		5	0.3%	1	0.2%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		1	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA		1	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		13	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		39	2.3%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		8	0.5%	9	2.0%	0	
NORMAL								
.000	NORMAL GLOBE		1,384	80.0%	325	71.6%	0	

LUCAS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation of the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lucas Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.
2. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman O, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011 Nov;14(6):378-84. doi: 10.1111/j.1463-5224.2011.00892.x. Epub 2011 Aug 3. PMID: 22050825.

OCULAR DISORDERS REPORT LUCAS TERRIER

There are no statistics available for this breed

MAGYAR AGAR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MAGYAR AGAR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

MAGYAR AGAR

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		4	133.3%	2	100.0%	0	

MALTESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Cataract	Not defined	2, 3	NO
C.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

B. Distichiasis

The presence of abnormally oriented eyelashes, frequently protruding from Meibomian gland ductal openings.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol.* 2005 Mar-Apr;8(2):101-11. doi: 10.1111/j.1463-5224.2005.00352.x. PMID: 15762923.
3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One.* 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT MALTESE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 384		2017-2021 283		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.3%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			6	1.6%	7	2.5%	0	
25.110 DISTICHIASIS			12	3.1%	3	1.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.3%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.5%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.5%	2	0.7%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			3	0.8%	1	0.4%	0	
70.700 CORNEAL DYSTROPHY			2	0.5%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			19	4.9%	2	0.7%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.4%	0	
95.120 CILIARY BODY CYST			1	0.3%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			17	4.4%	6	2.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			4	1.0%	5	1.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	1.0%	2	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.8%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			4	1.0%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.3%	1	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.3%	1	0.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			9	2.3%	9	3.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	2.3%	1	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.5%	2	0.7%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.3%	1	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.5%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.3%	1	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	2	0.7%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	2	0.7%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.4%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.5%	1	0.4%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			4	1.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			48	12.5%	30	10.6%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.3%	1	0.4%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			2	0.5%	1	0.4%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			12	3.1%	2	0.7%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.8%	1	0.4%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			5	1.3%	1	0.4%	0	
120.190 RETINAL DYSPLASIA, DETACHED			0	0.0%	1	0.4%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			4	1.0%	1	0.4%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			0	0.0%	1	0.4%	0	

OCULAR DISORDERS REPORT

MALTESE

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		384		283		0	
			#	%	#	%	#	%
OTHER								
900.000 OTHER, UNSPECIFIED			8	2.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			6	1.6%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	1.3%	12	4.2%	0	
NORMAL								
.000 NORMAL GLOBE			289	75.3%	232	82.0%	0	

MANCHESTER TERRIER

Standard & Toy Varieties

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1-3	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal Atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Manchester Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with

signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One*. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT MANCHESTER TERRIER

		Year Examined: Total # Dogs:		1991-2016 229		2017-2021 159		2021 0	
Diagnostic Name		#	%	#	%	#	%	#	%
EYELIDS									
25.110	DISTICHIASIS	1	0.4%	0	0.0%			0	
UVEA									
93.120	IRIS CYST	1	0.4%	0	0.0%			0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	15	6.6%	4	2.5%			0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.4%	0	0.0%			0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	1.7%	5	3.1%			0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.9%	0	0.0%			0	
LENS									
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	3.1%	5	3.1%			0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	3	1.9%			0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	1.3%	1	0.6%			0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	1	0.6%			0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.4%	1	0.6%			0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	1.3%	0	0.0%			0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.4%	1	0.6%			0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.4%	1	0.6%			0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.9%	1	0.6%			0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.9%	3	1.9%			0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.4%	1	0.6%			0	
100.317	INCIPIENT CATARACT, CAPSULAR	3	1.3%	1	0.6%			0	
100.328	Y-SUTURE TIP OPACITIES	2	0.9%	0	0.0%			0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	21	9.2%	14	8.8%			0	
VITREOUS									
110.135	PHPV/ PTVL	3	1.3%	1	0.6%			0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	1.3%	0	0.0%			0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	1.7%	1	0.6%			0	
RETINA									
120.170	RETINAL DYSPLASIA, FOLDS	1	0.4%	1	0.6%			0	
120.960	RETINOPATHY	1	0.4%	0	0.0%			0	
OTHER									
900.000	OTHER, UNSPECIFIED	6	2.6%	0	0.0%			0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	1.7%	6	3.8%			0	
NORMAL									
.000	NORMAL GLOBE	193	84.3%	132	83.0%			0	

MAREMMA SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Corneal dystrophy	Not defined	1	Breeder option
C.	Chronic superficial keratitis/pannus	Not defined	1	NO
D.	Cataract	Not defined	1	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans. This has been reported in the Italian population of the breed.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. This has been reported in the Italian population of the breed.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined. This has been reported in the Italian population of the breed.

References

1. Guandalini A, Di Girolamo N, Santillo D, Andreani V, Corvi R, Bandini M, and Peruccio C. (2017) Epidemiology of ocular disorders presumed to be inherited in three large Italian dog breeds in Italy. *Vet Ophthalmol*, 20: 420-426. doi:10.1111/vop.12442.

OCULAR DISORDERS REPORT MAREMMA SHEEPDOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	7.7%	1	11.1%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	11.5%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	3.8%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	3.8%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	11.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			2	7.7%	1	11.1%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			1	3.8%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	3.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	11.1%	0	
NORMAL								
.000 NORMAL GLOBE			20	76.9%	7	77.8%	0	

MARKIESJE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Markiesje is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Markiesje breed. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Genetic test available; no references

OCULAR DISORDERS REPORT MARKIESJE

There are no statistics available for this breed

MASTIFF

(English)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Uveal cysts	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy (<i>RHO</i>)	Autosomal dominant	1, 2, 3	NO	Mutation of the <i>RHO</i> gene
H.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	4	Breeder option	Mutation of the <i>BEST1</i> gene
I.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin

covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Mastiff, the strands most often bridge from the iris to the cornea and may potentially cause vision impairment. Thus, the strong recommendations against breeding animals with any form of this abnormality.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy - *RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. The ERG is normal at 3-6 months of age, but abnormal by 13 months of age. Increased exposure to bright light causes more rapid loss of neurons. PRA in the Mastiff is inherited as an autosomal dominant trait. The mutation is a single nucleotide transversion of the *RHO* gene. A DNA test is available.

H. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Kijas JW, Miller BJ, Pearce-Kelling SE, et al. Canine models of ocular disease: outcross breedings define a dominant disorder present in the English mastiff and bull mastiff dog breeds. *J Hered.* 2003;94:27-30.
3. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome.* 2012;23:40-61.
4. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007;48:1959-1967.

OCULAR DISORDERS REPORT MASTIFF

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 9,015		2017-2021 764		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			19	0.2%	3	0.4%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			344	3.8%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			392	4.3%	62	8.1%	0	
22.000 ECTROPION, UNSPECIFIED			638	7.1%	63	8.2%	0	
25.110 DISTICHIASIS			93	1.0%	5	0.7%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			4	0.0%	3	0.4%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			11	0.1%	1	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			18	0.2%	2	0.3%	0	
CORNEA								
70.210 PANNUS			3	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			37	0.4%	4	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			51	0.6%	1	0.1%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			88	1.0%	5	0.7%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			7	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			3	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			7	0.1%	5	0.7%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			279	3.1%	28	3.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			59	0.7%	3	0.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			462	5.1%	18	2.4%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			19	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.1%	3	0.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			47	0.5%	11	1.4%	0	
93.810 UVEAL MELANOMA			3	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			4	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			19	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			414	4.6%	29	3.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			95	1.1%	19	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			15	0.2%	4	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			8	0.1%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			15	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			15	0.2%	3	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			17	0.2%	6	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			21	0.2%	9	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			75	0.8%	4	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			43	0.5%	2	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			22	0.2%	4	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.1%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.1%	1	0.1%	0	

OCULAR DISORDERS REPORT MASTIFF

Year Examined: Total # Dogs:		1991-2016 9,015		2017-2021 764		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.316	INCIPIENT CATARACT, NUCLEUS	40	0.4%	10	1.3%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	11	0.1%	4	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	0.3%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	3	0.0%	1	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	7	0.1%	2	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	40	0.4%	1	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	5	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	465	5.2%	76	9.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	1	0.1%	0	
110.135	PHPV/ PTVL	5	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	10	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	659	7.3%	34	4.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	51	0.6%	2	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	5	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	151	1.7%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	9	0.1%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	4	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	4	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	59	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	166	1.8%	3	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	100	1.1%	31	4.1%	0	
NORMAL							
.000	NORMAL GLOBE	6,138	68.1%	495	64.8%	0	

MC NAB

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MC NAB breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT MC NAB

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0		1	14.3%	0	
FUNDUS 97.110 CHOROIDAL HYPOPLASIA		0		1	14.3%	0	
NORMAL .000 NORMAL GLOBE		0		6	85.7%	0	

MI-KI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration - syneresis - anterior chamber	Not defined Not defined	1 1	Breeder option Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Mi-Ki, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose

the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Mi-Ki is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT

MI-KI

Year Examined: Total # Dogs:		1991-2016 1,480		2017-2021 326		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	
20.160	MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	10	0.7%	1	0.3%	0	
25.110	DISTICHIASIS	204	13.8%	51	15.6%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	4	0.3%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	2	0.6%	0	
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS	3	0.2%	3	0.9%	0	
70.700	CORNEAL DYSTROPHY	26	1.8%	2	0.6%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	174	11.8%	27	8.3%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	1	0.3%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	127	8.6%	16	4.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.6%	2	0.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.5%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	46	3.1%	8	2.5%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	1	0.3%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.1%	1	0.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.3%	4	1.2%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.4%	1	0.3%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	12	0.8%	1	0.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	23	1.6%	3	0.9%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.3%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.3%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.3%	0	
100.328	Y-SUTURE TIP OPACITIES	11	0.7%	2	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	130	8.8%	26	8.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	2	0.6%	0	
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	38	2.6%	5	1.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	95	6.4%	18	5.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	11	0.7%	2	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.5%	1	0.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	0.4%	1	0.3%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.1%	0	0.0%	0	
120.960	RETINOPATHY	9	0.6%	3	0.9%	0	

OCULAR DISORDERS REPORT MI-KI

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	1,480		326		0	
		#	%	#	%	#	%
OPTIC NERVE							
130.110 MICROPAPILLA		2	0.1%	1	0.3%	0	
130.120 OPTIC NERVE HYPOPLASIA		2	0.1%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA		2	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		24	1.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		57	3.9%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		39	2.6%	28	8.6%	0	
NORMAL							
.000 NORMAL GLOBE		945	63.9%	202	62.0%	0	

MINIATURE AMERICAN SHEPHERD (AKC)/ MINIATURE AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Iris Coloboma	Not defined	1	NO	
D.	Iris hypoplasia	Not defined	1	Breeder option	
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
F.	Cataract	Autosomal co-dominant	1, 7, 8	NO	Mutation of the <i>HSF4</i> gene
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 9, 10	NO	Mutation of the <i>prcd</i> gene
H.	Cone degeneration - day blindness	Autosomal recessive	11, 12	NO	Mutation of the <i>CNGB3</i> gene
I.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	11, 12	Breeder option	Mutation of the <i>BEST1</i> gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
J.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 13-16	NO	Mutation of the <i>NHEJ1</i> gene
K.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress

normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Miniature American/Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

H. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

I. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal

detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

- J. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

- K. Coloboma/staphyloma (unassociated with microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

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OCULAR DISORDERS REPORT

MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 14,549		2017-2021 6,203		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			19	0.1%	9	0.1%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			0	0.0%	1	0.0%	0	
25.110 DISTICHIASIS			666	4.6%	179	2.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	3	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			0	0.0%	1	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			122	0.8%	95	1.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			5	0.0%	2	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			66	0.5%	86	1.4%	0	
93.120 IRIS CYST			0	0.0%	2	0.0%	0	
93.150 IRIS COLOBOMA			289	2.0%	115	1.9%	0	
93.180 IRIS SPHINCTER DYSPLASIA			5	0.0%	15	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1,350	9.3%	806	13.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			24	0.2%	13	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			7	0.0%	2	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			9	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.0%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.0%	1	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			6	0.0%	2	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			27	0.2%	11	0.2%	0	
97.120 COLOBOMA			8	0.1%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			169	1.2%	74	1.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			28	0.2%	29	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			13	0.1%	5	0.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			8	0.1%	9	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.0%	3	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			33	0.2%	9	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			8	0.1%	16	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			14	0.1%	14	0.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			27	0.2%	17	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			28	0.2%	5	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.1%	7	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.0%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.0%	2	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.0%	14	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	2	0.0%	0	

OCULAR DISORDERS REPORT

MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

Year Examined: Total # Dogs:		1991-2016 14,549		2017-2021 6,203		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	3	0.0%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	11	0.1%	24	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	206	1.4%	164	2.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	50	0.3%	50	0.8%	0	
110.135	PHPV/ PTVL	15	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	14	0.1%	12	0.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	63	0.4%	18	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	47	0.3%	14	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.2%	1	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	
120.960	RETINOPATHY	2	0.0%	3	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	69	0.5%	16	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	20	0.1%	6	0.1%	0	
130.150	OPTIC DISC COLOBOMA	26	0.2%	7	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	129	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	184	1.3%	6	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	104	0.7%	163	2.6%	0	
NORMAL							
.000	NORMAL GLOBE	12,232	84.1%	4,701	75.8%	0	

MINIATURE BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- iris to cornea	Not defined	1	NO	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2-4	NO	Mutation of the <i>ADAMTS17</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Although the total number of Miniature Bull Terriers presented for OFA/CERF examination is not large, the incidence of PPM in this breed is approximately 10% in recent years. Some of these PPM's have been iris to cornea and iris to lens. Considerable discretion should be used before breeding a dog with the latter more severe forms of PPM.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

Two loci with potentially enhancing effects on the ADAMTS17 mutation are associated with primary lens luxation (PLL) in Australian Miniature Bull Terriers. PLL associated allele of the BICF2G630420272 SNP increases the risk of PLL in the presence of the ADAMTS17 mutation. Candidate genes in the two regions of interest included CPE on chromosome 15 and CTCF on chromosome 1. The ADAMTS17 mutation is also associated with abnormal foot and nail shapes, pedal hyperkeratosis, and persistent pupillary membranes. Association of the ADAMTS17 mutation with possible pedal skeletal abnormalities in the Miniature Bull Terriers supports primary lens luxation in this breed and Marchesani syndrome-like disease in humans as being homologous diseases.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Komaromy A. Genetics of canine primary glaucomas. *Vet Clin Small Anim.* 2015; 45: 1159-1182.
3. Gharanhkhani P, O'Leary CA, Duffy DL, Kyaw-Tanner M. Potential modifying loci associated with primary lens luxation, pedal hyperkeratosis, and ocular phenotypes in Miniature Bull Terriers. *Invest. Ophthalmol. Vis. Sci.* 2015; 56(13):8288-8296. doi:10.1167/iovs.15-18074.
4. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman O, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011 Nov;14(6):378-84. doi: 10.1111/j.1463-5224.2011.00892.x. Epub 2011 Aug 3. PMID: 22050825.

OCULAR DISORDERS REPORT MINIATURE BULL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,260		2017-2021 91		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			3	0.2%	0	0.0%	0	
10.000 GLAUCOMA			1	0.1%	0	0.0%	0	
EYELIDS								
22.000 ECTROPION, UNSPECIFIED			1	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			1	0.1%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			5	0.4%	1	1.1%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			5	0.4%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			13	1.0%	0	0.0%	0	
UVEA								
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			4	0.3%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			80	6.3%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			52	4.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			82	6.5%	1	1.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.6%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.6%	3	3.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			14	1.1%	3	3.3%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			52	4.1%	5	5.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			14	1.1%	2	2.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.2%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.1%	1	1.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			7	0.6%	2	2.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			15	1.2%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			5	0.4%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.1%	1	1.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			12	1.0%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			4	0.3%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			51	4.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			67	5.3%	6	6.6%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			4	0.3%	1	1.1%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			20	1.6%	1	1.1%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.2%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			13	1.0%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	2	2.2%	0	

OCULAR DISORDERS REPORT MINIATURE BULL TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,260		91		0	
			#	%	#	%	#	%
OPTIC NERVE								
130.110	MICROPAPILLA		12	1.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA		3	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA		1	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		9	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		33	2.6%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		23	1.8%	1	1.1%	0	
NORMAL								
.000	NORMAL GLOBE		935	74.2%	76	83.5%	0	

MINIATURE PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Passes with no notation	
	- lens pigment foci/no strands				
C.	Cataract	Autosomal recessive	1, 2	NO	Mutation in the <i>HS4-1</i> gene
D.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The condition is inherited as an autosomal recessive mutation in the HSF4 gene (*HSF4-1*). A DNA test is available.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT MINIATURE PINSCHER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 832		2017-2021 279		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			3	0.4%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			3	0.4%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			5	0.6%	1	0.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.1%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.2%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.5%	2	0.7%	0	
70.700 CORNEAL DYSTROPHY			44	5.3%	14	5.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.2%	0	0.0%	0	
UVEA								
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			26	3.1%	5	1.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			9	1.1%	6	2.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	3	1.1%	0	
FUNDUS								
97.120 COLOBOMA			1	0.1%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			30	3.6%	8	2.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			7	0.8%	4	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			5	0.6%	1	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.1%	1	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.4%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.2%	2	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.2%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			19	2.3%	9	3.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			10	1.2%	1	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			3	0.4%	1	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	4	1.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	3	1.1%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	2	0.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	0.8%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			0	0.0%	1	0.4%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.4%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			64	7.7%	30	10.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			5	0.6%	0	0.0%	0	

OCULAR DISORDERS REPORT MINIATURE PINSCHER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		832		279		0	
		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	2	0.2%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	1.1%	1	0.4%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	36	4.3%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.2%	1	0.4%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	12	1.4%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.4%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.2%	1	0.4%	0	
130.120	OPTIC NERVE HYPOPLASIA	9	1.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	12	1.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	26	3.1%	1	0.4%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	2.0%	16	5.7%	0	
NORMAL							
.000	NORMAL GLOBE	623	74.9%	215	77.1%	0	

MINIATURE SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with congenital cataract	Autosomal recessive	1-4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Autosomal recessive	1, 5-8	NO	
E.	Retinal dysplasia with Persistent hyperplastic primary vitreous (PHPV)	Autosomal recessive	11	NO	
F.	Retinal atrophy - generalized	Autosomal recessive	1, 9, 10, 12	NO	
	Retinal atrophy- <i>PPT1</i>	Autosomal recessive	13	NO	Mutation in the gene <i>PPT1</i>
G.	Ceroid lipofuscinosis	Presumed autosomal recessive	14, 15	NO	

Description and Comments

A. Microphthalmia with congenital cataract

Congenital nuclear and posterior cortical lens opacities that progress slowly. In some cases, these cataracts appear similar to the congenital cataracts described in "E" below. An associated abnormality in this defect is microphthalmia that is often mild and is accompanied by a 1-3 mm reduction in the axial length of the globe as determined by ultrasonography. The cataracts often do not become mature and cause blindness until the dogs reach 3-5 years of age. Congenital cataracts and microphthalmia are inherited as an autosomal recessive disorder.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts in the Miniature Schnauzer are bilateral and appear prior to 6 weeks of age. At this time they may already involve the entire lens. Others will first appear as posterior subcapsular opacities and usually progress to complete cataracts. These congenital cataracts are inherited as an autosomal recessive trait. Later-onset cataracts may represent a genetically distinct entity. There are other types of cataract in the breed which are also likely hereditary.

Note: It is not certain whether A and F are genetically distinct, or different manifestations of the same entity, as eyes affected with cataracts are often smaller than normal.

E. Retinal dysplasia with persistent hyperplastic primary vitreous (PHPV)

In the Miniature Schnauzer PHPV is associated with retinal dysplasia in some dogs. In this association it may be unilateral or bilateral and most often manifests as small white posterior lens capsule plaques accompanied by white primary vitreous mass extending to the optic disc. Patent hyaloid arteries and posterior lens capsule vessels may also be present.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent

clinically. With limited exceptions, most forms of PRA are inherited as recessive traits.

A form of PRA in the Miniature Schnauzer was previously characterized and called photoreceptor dysplasia (now called Type A PRA). The dysplasia results from the abnormal development of visual cells followed by their degeneration. The disorder appears to affect the generation of an electrical signal within the retinal photoreceptor cells. Although fundus abnormalities usually are not present until 2-3 years of age, abnormalities of the electroretinogram can be demonstrated by 8-10 weeks of age. Clinical signs include mildly impaired night vision and variable rate of progression.

Initial studies suggested a mutation in phosducin was responsible, but this was disproven. This disease is extremely rare. The causative gene for Type A PRA has not been published although a DNA test is available. Another more common autosomal recessive form of PRA appears to be present in the Miniature Schnauzer, but the causative gene has not yet been determined; it also affects dogs ~2-4 years of age. Lastly, cases of late-onset PRA in the breed are recognized clinically but the inheritance pattern is unknown. (G. Aguirre personal communication 2016).

PPT1 mutations have been identified to segregate with PRA in Miniature Schnauzers. Age of onset is variable, and more than one variant may be causative. Penetrance of the mutation may be incomplete so care should be taken in interpretation of genetic testing results.

G. Ceroid lipofuscinosis

An inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease). This disease is very rare.

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OCULAR DISORDERS REPORT MINIATURE SCHNAUZER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 29,976		2017-2021 6,111		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			23	0.1%	2	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			5	0.0%	9	0.1%	0	
25.110 DISTICHIASIS			621	2.1%	100	1.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	3	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			6	0.0%	2	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			2	0.0%	1	0.0%	0	
70.220 PIGMENTARY KERATITIS			7	0.0%	3	0.0%	0	
70.700 CORNEAL DYSTROPHY			153	0.5%	21	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			17	0.1%	1	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			2	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			0	0.0%	2	0.0%	0	
93.120 IRIS CYST			1	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			10	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			486	1.6%	101	1.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			50	0.2%	3	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			80	0.3%	8	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			12	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			93	0.3%	75	1.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			13	0.0%	2	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			4	0.0%	1	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			61	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			612	2.0%	123	2.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			139	0.5%	46	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			60	0.2%	12	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			52	0.2%	7	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			16	0.1%	1	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			83	0.3%	33	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			18	0.1%	11	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			48	0.2%	21	0.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			112	0.4%	31	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			142	0.5%	29	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			65	0.2%	20	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			8	0.0%	3	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			38	0.1%	1	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			26	0.1%	19	0.3%	0	

OCULAR DISORDERS REPORT MINIATURE SCHNAUZER

Year Examined: Total # Dogs:		1991-2016 29,976		2017-2021 6,111		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.317	INCIPIENT CATARACT, CAPSULAR	30	0.1%	12	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	10	0.0%	10	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	15	0.1%	12	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	2	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	4	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	15	0.1%	15	0.2%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	19	0.1%	19	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	152	0.5%	4	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,114	3.7%	314	5.1%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	39	0.1%	15	0.2%	0	
110.135	PHPV/ PTVL	24	0.1%	1	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	42	0.1%	10	0.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	139	0.5%	15	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	67	0.2%	4	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	49	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	32	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	150	0.5%	6	0.1%	0	
120.400	RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	
120.960	RETINOPATHY	4	0.0%	3	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	44	0.1%	17	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	16	0.1%	2	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	158	0.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	340	1.1%	6	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	179	0.6%	138	2.3%	0	
NORMAL							
.000	NORMAL GLOBE	27,297	91.1%	5,440	89.0%	0	

MUDI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT MUDI

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 74		2017-2021 222		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			2	2.7%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.5%	0	
70.700 CORNEAL DYSTROPHY			0	0.0%	2	0.9%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			8	10.8%	19	8.6%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.5%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	2.7%	8	3.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	5	2.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	1.4%	8	3.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	1.4%	1	0.5%	0	
100.328 Y-SUTURE TIP OPACITIES			1	1.4%	5	2.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			3	4.1%	22	9.9%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	0.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	1	0.5%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	1.4%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	4.1%	19	8.6%	0	
NORMAL								
.000 NORMAL GLOBE			61	82.4%	172	77.5%	0	

MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT MUNSTERLANDER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	0		0	

NATIVE AMERICAN INDIAN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN INDIAN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NATIVE AM. INDIAN DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
LENS								
100.326 INCOMPLETE CATARACT, NUCLEUS			1	100.0%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	100.0%	0		0	

NATIVE AMERICAN VILLAGE DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN VILLAGE DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NATIVE AM. VILLAGE DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	50.0%	0	0.0%	0	
NORMAL .000 NORMAL GLOBE			1	50.0%	1	100.0%	0	

NEAPOLITAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Ectropion	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT NEAPOLITAN MASTIFF

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	77		26		0	
			#	%	#	%	#	%
EYELIDS								
20.160	MACROPALPEBRAL FISSURE		14	18.2%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED		19	24.7%	7	26.9%	0	
22.000	ECTROPION, UNSPECIFIED		27	35.1%	15	57.7%	0	
25.110	DISTICHIASIS		8	10.4%	3	11.5%	0	
NASOLACRIMAL								
40.910	KERATOCONJUNCTIVITIS SICCA		1	1.3%	0	0.0%	0	
NICTITANS								
51.100	THIRD EYELID CARTILAGE ANOMALY		1	1.3%	1	3.8%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID		5	6.5%	1	3.8%	0	
CORNEA								
70.220	PIGMENTARY KERATITIS		3	3.9%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY		1	1.3%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		0	0.0%	1	3.8%	0	
UVEA								
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		1	1.3%	0	0.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	1.3%	3	11.5%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		1	1.3%	2	7.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		0	0.0%	1	3.8%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		1	1.3%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		1	1.3%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		3	3.9%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		6	7.8%	3	11.5%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		2	2.6%	0	0.0%	0	
120.960	RETINOPATHY		1	1.3%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		1	1.3%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		1	1.3%	1	3.8%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		6	7.8%	4	15.4%	0	
NORMAL								
.000	NORMAL GLOBE		25	32.5%	7	26.9%	0	

NEDERLANDSE KOOIKERHONDJE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NEDERLANDSE KOOIKERHONDJE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NEDERLANDSE KOOIKERHONDJE

Year Examined: Total # Dogs:		1991-2016 100		2017-2021 154		2021 0	
Diagnostic Name		#	%	#	%	#	%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.0%	3	1.9%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	1.0%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.6%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	7.0%	4	2.6%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.0%	0	0.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.6%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	1.0%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	2.0%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	1	1.0%	2	1.3%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	3.0%	1	0.6%	0	
100.328	Y-SUTURE TIP OPACITIES	1	1.0%	2	1.3%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	9	9.0%	6	3.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	1.0%	2	1.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	2	2.0%	3	1.9%	0	
RETINA							
120.960	RETINOPATHY	1	1.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	2	2.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	6.0%	9	5.8%	0	
NORMAL							
.000	NORMAL GLOBE	85	85.0%	134	87.0%	0	

NEW ZEALAND HUNTAWAY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NEW ZEALAND HUNTAWAY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NEW ZEALAND HUNTAWAY

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
UVEA 93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	50.0%	0		0	
NORMAL .000 NORMAL GLOBE			2	100.0%	0		0	

NEWFOUNDLAND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2	NO
B.	Entropion	Not defined	1	Breeder option
C.	Ectropion	Not defined	1	Breeder option
D.	Uveal cysts	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Retinal atrophy - generalized	Not defined	3	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

Some Newfoundlands have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmic examination using a slitlamp biomicroscope and an indirect ophthalmoscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. The inheritance of goniodysgenesis in the Newfoundland is not known. Until the inheritance is determined, control should be directed towards removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny afflicted with glaucoma.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation

due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions in various breeds.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126.
3. Dekomien G and Epplen JT. Evaluation of the canine RPE65 gene in affected dogs with generalized progressive retinal atrophy. *Mol Vis*. 2003 Nov 11;9:601-605.

OCULAR DISORDERS REPORT NEWFOUNDLAND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,191		2017-2021 495		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			6	0.2%	0	0.0%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			128	4.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			212	6.6%	42	8.5%	0	
22.000 ECTROPION, UNSPECIFIED			226	7.1%	19	3.8%	0	
25.110 DISTICHIASIS			21	0.7%	2	0.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			14	0.4%	4	0.8%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			10	0.3%	4	0.8%	0	
CORNEA								
70.210 PANNUS			1	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.1%	2	0.4%	0	
70.700 CORNEAL DYSTROPHY			1	0.0%	1	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			0	0.0%	1	0.2%	0	
UVEA								
93.120 IRIS CYST			47	1.5%	7	1.4%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			3	0.1%	2	0.4%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			22	0.7%	1	0.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			5	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.2%	1	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			4	0.1%	2	0.4%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			11	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			106	3.3%	14	2.8%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			11	0.3%	6	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			13	0.4%	2	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.2%	3	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			12	0.4%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			4	0.1%	1	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			6	0.2%	3	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			23	0.7%	2	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			89	2.8%	13	2.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			20	0.6%	5	1.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			13	0.4%	1	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			14	0.4%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			8	0.3%	3	0.6%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.6%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			5	0.2%	4	0.8%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	2	0.4%	0	

OCULAR DISORDERS REPORT NEWFOUNDLAND

Year Examined: Total # Dogs:		1991-2016 3,191		2017-2021 495		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	38	1.2%	4	0.8%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	281	8.8%	54	10.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.2%	0	0.0%	0	
110.135	PHPV/ PTVL	4	0.1%	1	0.2%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	27	0.8%	2	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.2%	0	
120.960	RETINOPATHY	1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	7	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	29	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	72	2.3%	3	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	48	1.5%	16	3.2%	0	
NORMAL							
.000	NORMAL GLOBE	2,412	75.6%	370	74.7%	0	

NORFOLK TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAMTS17</i> gene
E.	Optic nerve hypoplasia	Not defined	1	NO	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Optic nerve hypoplasia

A congenital anomaly, which results in a small optic disk diameter and vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.
3. Komaromy A. Genetics of canine primary glaucomas. *Vet Clin Small Anim.* 2015; 45: 1159-1182.

OCULAR DISORDERS REPORT NORFOLK TERRIER

		Year Examined: Total # Dogs:	1991-2016 1,376		2017-2021 422		2021 0	
Diagnostic Name			#	%	#	%	#	%
EYELIDS								
20.160	MACROPALPEBRAL FISSURE		1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS		6	0.4%	1	0.2%	0	
NASOLACRIMAL								
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM		0	0.0%	1	0.2%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		2	0.1%	0	0.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		12	0.9%	7	1.7%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		1	0.1%	2	0.5%	0	
UVEA								
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM		1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		287	20.9%	100	23.7%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		1	0.1%	1	0.2%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		4	0.3%	3	0.7%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		9	0.7%	10	2.4%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		2	0.1%	7	1.7%	0	
FUNDUS								
97.120	COLOBOMA		1	0.1%	0	0.0%	0	
LENS								
100.200	CATARACT, UNSPECIFIED		1	0.1%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		44	3.2%	8	1.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		5	0.4%	2	0.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		5	0.4%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		8	0.6%	1	0.2%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		2	0.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		4	0.3%	1	0.2%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		7	0.5%	6	1.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		16	1.2%	5	1.2%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		6	0.4%	4	0.9%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		2	0.1%	1	0.2%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		0	0.0%	1	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR		4	0.3%	2	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	2	0.5%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		2	0.1%	1	0.2%	0	
100.328	Y-SUTURE TIP OPACITIES		0	0.0%	1	0.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		4	0.3%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		67	4.9%	27	6.4%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		7	0.5%	2	0.5%	0	
110.135	PHPV/ PTVL		1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		8	0.6%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		7	0.5%	1	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		2	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		10	0.7%	1	0.2%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT NORFOLK TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,376		422		0	
			#	%	#	%	#	%
OPTIC NERVE								
130.110 MICROPAPILLA			11	0.8%	3	0.7%	0	
130.120 OPTIC NERVE HYPOPLASIA			18	1.3%	9	2.1%	0	
130.150 OPTIC DISC COLOBOMA			19	1.4%	1	0.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			14	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			38	2.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			26	1.9%	12	2.8%	0	
NORMAL								
.000 NORMAL GLOBE			987	71.7%	266	63.0%	0	

NORRBOTTENSPETS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation of the <i>prcd</i> gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Norbottenspets is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Correction: Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2019 Jan 18;15(1):e1007938. doi: 10.1371/journal.pgen.1007938. Erratum for: PLoS Genet. 2018 Apr 30;14(4):e1007361. PMID: 30657768; PMCID: PMC6338350.

OCULAR DISORDERS REPORT NORRBOTTENSPETS

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 107		2017-2021 19		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	0.9%	1	5.3%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			1	0.9%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			6	5.6%	2	10.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.9%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	2	10.5%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	4.7%	2	10.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	1.9%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.9%	1	5.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.9%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	6.5%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			9	8.4%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.9%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	2.8%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	5.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.9%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			25	23.4%	2	10.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.9%	1	5.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			2	1.9%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			3	2.8%	0	0.0%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	5.3%	0	
NORMAL								
.000 NORMAL GLOBE			83	77.6%	13	68.4%	0	

NORTH AMERICAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORTH AMERICAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NORTH AMERICAN SHEPHERD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
VITREOUS 110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	16.7%	0		0	
NORMAL .000 NORMAL GLOBE			5	83.3%	0		0	

NORTHERN INUIT

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal dysplasia - folds/geographic/detached (with skeletal defects)	Autosomal recessive	1, 2	NO	Mutation in the COL9A3 gene

Description and Comments

- A. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) also occurs in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of COL9A3. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Stavinochova R, Hartley C, Burmeister LM, Ricketts SL, Pettitt L, Tetas Pont R, Hitti RJ, Schofield E, Oliver JAC, Mellersh CS. Clinical, histopathological and genetic characterisation of oculoskeletal dysplasia in the Northern Inuit Dog. PLoS One. 2019 Aug 15;14(8):e0220761. doi: 10.1371/journal.pone.0220761. PMID: 31415586; PMCID: PMC6695176.

OCULAR DISORDERS REPORT NORTHERN INUIT

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
LENS							
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	6.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX		0	0.0%	1	6.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	1	6.3%	0	
NORMAL							
.000 NORMAL GLOBE		4	100.0%	15	93.8%	0	

NORWEGIAN BUHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1, 3	NO
B.	Cataract - pulverulent	Presumed autosomal dominant	2, 3	Breeder option
C.	Y-suture top opacity	Not defined	1	Breeder option

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

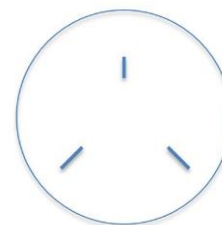
B. Cataract - pulverulent

With the pulverulent cataract in the Norwegian Buhund, initial lens changes may be visible as early as 6.5 weeks of age as small dots parallel to the suture lines behind the nucleus. By the age of 4 to 5.5 years, the opacities progress to involve the fetal nucleus which then resembles a ball of candy floss. The adult nucleus and the cortex remain clear. An autosomal dominant mode of inheritance with a high degree of penetrance has been suggested.

Rates of progression of these cataracts can vary, and have been noted to develop in older animals (over the age of 7) that were previously documented to be free from this condition.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are



considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.

These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Bjerkas E and Haaland MB. Pulverulent nuclear cataract in the Norwegian Buhund. *J Small Anim Pract.* 1995;36:471-474.
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OCULAR DISORDERS REPORT NORWEGIAN BUHUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 703		2017-2021 317		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.1%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			2	0.3%	1	0.3%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.3%	0	
70.700 CORNEAL DYSTROPHY			7	1.0%	2	0.6%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.1%	0	0.0%	0	
93.120 IRIS CYST			0	0.0%	1	0.3%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			2	0.3%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.1%	2	0.6%	0	
93.810 UVEAL MELANOMA			0	0.0%	1	0.3%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			81	11.5%	41	12.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	1.1%	7	2.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			11	1.6%	4	1.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.1%	1	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.3%	1	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			9	1.3%	13	4.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			22	3.1%	20	6.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	1	0.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			4	0.6%	4	1.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			20	2.8%	7	2.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.3%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			10	1.4%	4	1.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			15	2.1%	7	2.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.3%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			13	1.8%	4	1.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			6	0.9%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			127	18.1%	74	23.3%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			0	0.0%	3	0.9%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			8	1.1%	3	0.9%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			0	0.0%	1	0.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			3	0.4%	2	0.6%	0	
120.960 RETINOPATHY			3	0.4%	6	1.9%	0	
120.970 CMR/ CMR-LIKE RETINOPATY			0	0.0%	1	0.3%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			14	2.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			18	2.6%	5	1.6%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			18	2.6%	19	6.0%	0	
NORMAL								
.000 NORMAL GLOBE			518	73.7%	215	67.8%	0	

NORWEGIAN ELKHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Autosomal recessive	1-6	NO	Mutation of the <i>ADAMS10</i> gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation of the <i>prcd</i> gene
F.	Retinal atrophy - generalized				
	1. Rod dysplasia (<i>rd</i>)	Autosomal recessive	7-10	NO	
	2. Early retinal degeneration (<i>erd</i>)	Autosomal recessive	11-15	NO	Mutation of the <i>STK38L</i> gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

In the Norwegian Elkhound, glaucoma appears to be familial. In most cases the drainage angle is reported to be open. A mutation has been found in *ADAMTS10* in some Norwegian Elkhounds with glaucoma, but a genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Norwegian Elkhound is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

F. Retinal atrophy - generalized

1. **Rod dysplasia (*rd*)**: Inappropriate development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years. Ophthalmoscopic signs may be evident after 5 months of age, with signs of retinal vascular thinning after 2 years. An ERG can provide a diagnosis as early as 6 weeks of age. In the Norwegian Elkhound, this is an autosomal recessive trait.

2. **Early retinal degeneration (*erd*)**: Another form of PRA reported in the Norwegian Elkhound. Animals are night blind at 6 weeks and blind by 1 year of age. Clinical signs are

evident by 6 months. On histopathologic examination there is an abnormal structural development of the photoreceptors followed by rapid rod/cone degeneration. The mutation is found in the *STK38L* gene and is inherited as an autosomal recessive trait. While a DNA test is available, no Norwegian Elkhounds are thought to exist with this mutation anymore.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Ekesten B, Bjerkaas E, Kongsengen Kea. Primary glaucoma in the Norwegian Elkhound. *Vet Comp Ophthalmol*. 1997;7:14-18.
3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111.
4. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030.
5. Ahonen SJ, Kaukonen M, Nussdorfer FD, et al. A novel missense mutation in ADAMTS10 in Norwegian Elkhound primary glaucoma. *PLoS One*. 2014;9:e111941.
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13. Ray K, Acland GM, Aguirre GD. Nonallelism of erd and prcd and exclusion of the canine RDS/peripherin gene as a candidate for both retinal degeneration loci. *Invest Ophthalmol Vis Sci.* 1996;37:783-794.
14. Kukekova AV, Aguirre GD, Acland GM. Cloning and characterization of canine SHARP1 and its evaluation as a positional candidate for canine early retinal degeneration (erd). *Gene.* 2003;312:335-343.
15. Goldstein O, Kukekova AV, Aguirre GD, et al. Exonic SINE insertion in STK38L causes canine early retinal degeneration (erd). *Genomics.* 2010;96:362-368.

OCULAR DISORDERS REPORT NORWEGIAN ELKHOUND

Year Examined: Total # Dogs:		1991-2016 2,594		2017-2021 234		2021 0	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.2%	0	0.0%	0	
10.000	GLAUCOMA	2	0.1%	0	0.0%	0	
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	16	0.6%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	5	0.2%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED	14	0.5%	0	0.0%	0	
25.110	DISTICHIASIS	45	1.7%	2	0.9%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.1%	0	0.0%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	
CORNEA							
70.210	PANNUS	2	0.1%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	9	0.3%	2	0.9%	0	
UVEA							
93.120	IRIS CYST	6	0.2%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	35	1.3%	2	0.9%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.4%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.2%	1	0.4%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	0.1%	4	1.7%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	23	0.9%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	107	4.1%	18	7.7%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	0.4%	3	1.3%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	9	0.3%	2	0.9%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	1	0.4%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.4%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	12	0.5%	3	1.3%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	4	1.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	2	0.9%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.5%	1	0.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	38	1.5%	2	0.9%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	22	0.8%	4	1.7%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	8	0.3%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.3%	3	1.3%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.3%	0	0.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	1	0.4%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.4%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	6	2.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.3%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.2%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	182	7.0%	35	15.0%	0	

OCULAR DISORDERS REPORT NORWEGIAN ELKHOUND

Year Examined: Total # Dogs:		1991-2016 2,594		2017-2021 234		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	7	0.3%	0	0.0%	0	
110.135	PHPV/ PTVL	2	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	7	0.3%	1	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	45	1.7%	5	2.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	10	0.4%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	3	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.4%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	22	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	32	1.2%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	0.7%	22	9.4%	0	
NORMAL							
.000	NORMAL GLOBE	2,227	85.9%	172	73.5%	0	

NORWEGIAN LUNDEHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORWEGIAN LUNDEHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT NORWEGIAN LUNDEHUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		50		2		0	
			#	%	#	%	#	%
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			13	26.0%	1	50.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	2.0%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			8	16.0%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	2.0%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	4.0%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	4.0%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	2.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	4.0%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	6.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			11	22.0%	0	0.0%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			2	4.0%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	2.0%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			31	62.0%	1	50.0%	0	

NORWICH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	2	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to

be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT NORWICH TERRIER

Year Examined: Total # Dogs:		1991-2016 3,210		2017-2021 603		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	
25.110	DISTICHIASIS	20	0.6%	12	2.0%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.1%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.1%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	18	0.6%	5	0.8%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	1	0.0%	0	0.0%	0	
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	182	5.7%	17	2.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.1%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.2%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.2%	3	0.5%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.2%	1	0.2%	0	
FUNDUS							
97.120	COLOBOMA	2	0.1%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.2%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	76	2.4%	10	1.7%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	15	0.5%	4	0.7%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.3%	2	0.3%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	3	0.5%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.2%	1	0.2%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.1%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	4	0.7%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	17	0.5%	5	0.8%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	0.6%	5	0.8%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	13	0.4%	2	0.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	13	0.4%	4	0.7%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.0%	3	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	4	0.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.4%	1	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	133	4.1%	41	6.8%	0	

OCULAR DISORDERS REPORT NORWICH TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 3,210		2017-2021 603		2021 0	
		#	%	#	%	#	%
VITREOUS							
110.120 PERSISTENT HYALOID ARTERY/ REMNANT		3	0.1%	0	0.0%	0	
110.135 PHPV/ PTVL		1	0.0%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS		11	0.3%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		7	0.2%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		4	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		14	0.4%	0	0.0%	0	
120.960 RETINOPATHY		5	0.2%	2	0.3%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		1	0.0%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA		8	0.2%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA		3	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		28	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		51	1.6%	1	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		26	0.8%	9	1.5%	0	
NORMAL							
.000 NORMAL GLOBE		2,859	89.1%	529	87.7%	0	

NOVA SCOTIA DUCK TOLLING RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation of the <i>prcd</i> gene
G.	Choroidal hypoplasia (Collie eye anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3, 4	NO	Mutation of the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

In the Nova Scotia Duck Tolling Retriever, many of the PPMs identified on routine screening examinations bridge from the iris to the lens where they are associated with focal cataract. This may result in vision impairment.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Nova Scotia Duck Tolling Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

- G. Choroidal hypoplasia (Collie eye anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res.* 2007 Nov;17:1562-1571.
3. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for Collie eye anomaly. *Genomics.* 2003;82:86-95.
4. Brown EA, Thomasy SM, Murphy CJ, Bannasch DL. Genetic analysis of optic nerve head coloboma in the Nova Scotia Duck Tolling Retriever identifies discordance with the NHEJ1 intronic deletion (collie eye anomaly mutation). *Vet Ophthalmol.* 2018 Mar;21(2):144-150. doi: 10.1111/vop.12488. Epub 2017 Jul 12. PMID: 28702949; PMCID: PMC5766432.

OCULAR DISORDERS REPORT NOVA SCOTIA DUCK TOLLING RETRIEVER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,726		2017-2021 1,314		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	2	0.2%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			698	12.2%	168	12.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			7	0.1%	8	0.6%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			5	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			5	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			149	2.6%	35	2.7%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			21	0.4%	1	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			120	2.1%	46	3.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			53	0.9%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.0%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			135	2.4%	92	7.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			18	0.3%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			330	5.8%	82	6.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			46	0.8%	17	1.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			30	0.5%	3	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			15	0.3%	7	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			0	0.0%	6	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			17	0.3%	9	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			29	0.5%	19	1.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			24	0.4%	28	2.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			20	0.3%	6	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			36	0.6%	4	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.4%	1	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.1%	3	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			12	0.2%	3	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			11	0.2%	8	0.6%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.1%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.0%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.1%	0	

OCULAR DISORDERS REPORT NOVA SCOTIA DUCK TOLLING RETRIEVER

Year Examined: Total # Dogs:		1991-2016 5,726		2017-2021 1,314		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	9	0.2%	22	1.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	308	5.4%	138	10.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	15	0.3%	12	0.9%	0	
110.135	PHPV/ PTVL	7	0.1%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	12	0.2%	2	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	49	0.9%	8	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	13	0.2%	2	0.2%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	97	1.7%	1	0.1%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	13	0.2%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	13	0.2%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	3	0.1%	1	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	98	1.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	279	4.9%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	105	1.8%	88	6.7%	0	
NORMAL							
.000	NORMAL GLOBE	4,297	75.0%	827	62.9%	0	

OLD ENGLISH SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular anomalies	Not defined	1, 2	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1, 3	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

Microphthalmia is a developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

Microphthalmia with cataract and retinal abnormalities including retinal detachment, has been reported in litters of Old English Sheepdogs. Lesions were non-progressive. However, blindness did result in some dogs. The mode of inheritance is unknown, but affected dogs should not be bred.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. In one study of 66 interrelated Old English Sheepdogs, an autosomal recessive mode of inheritance was suggested. Retinal detachment was an associated finding in 5/43 affected dogs in this study. The location of the opacity within the lens and the age of onset was highly variable.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barrie K. Posterior lenticonus, microphthalmia, cataracts and retinal folds in Old English Sheepdogs. *J Am Anim Hosp Assoc.* 1979;15:715.
3. Koch SA. Cataracts in interrelated Old English Sheepdogs. *J Am Vet Med Assoc.* 1972 Feb 1;160:299-301.

OCULAR DISORDERS REPORT OLD ENGLISH SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 5,156		2017-2021 980		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			10	0.2%	0	0.0%	0	
10.000 GLAUCOMA			4	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			12	0.2%	1	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			87	1.7%	17	1.7%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.0%	2	0.2%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			20	0.4%	8	0.8%	0	
UVEA								
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			442	8.6%	158	16.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.1%	3	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			9	0.2%	1	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			10	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.0%	3	0.3%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			3	0.1%	1	0.1%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			35	0.7%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			273	5.3%	69	7.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			62	1.2%	30	3.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			11	0.2%	3	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			10	0.2%	2	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			6	0.1%	5	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			7	0.1%	6	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			18	0.3%	4	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			15	0.3%	25	2.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			44	0.9%	11	1.1%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			45	0.9%	6	0.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			17	0.3%	1	0.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			11	0.2%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	0.3%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			32	0.6%	4	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.1%	3	0.3%	0	

OCULAR DISORDERS REPORT OLD ENGLISH SHEEPDOG

Year Examined: Total # Dogs:		1991-2016 5,156		2017-2021 980		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	1	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	2	0.2%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	2	0.0%	4	0.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	61	1.2%	2	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	2	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	404	7.8%	112	11.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	17	0.3%	2	0.2%	0	
110.135	PHPV/ PTVL	3	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	26	0.5%	1	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	90	1.7%	6	0.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	13	0.3%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.2%	0	0.0%	0	
120.960	RETINOPATHY	0	0.0%	5	0.5%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	15	0.3%	10	1.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	15	0.3%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	4	0.1%	1	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	35	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	77	1.5%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	54	1.0%	32	3.3%	0	
NORMAL							
.000	NORMAL GLOBE	4,120	79.9%	675	68.9%	0	

OLD ENGLISH BULLDOGGE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OLD ENGLISH BULLDOGGE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT OLDE ENGLISH BULLDOGGE

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		19		12		0	
		#	%	#	%	#	%
EYELIDS							
21.000 ENTROPION, UNSPECIFIED		2	10.5%	0	0.0%	0	
25.110 DISTICHIASIS		6	31.6%	2	16.7%	0	
UVEA							
93.110 IRIS HYPOPLASIA		1	5.3%	0	0.0%	0	
93.120 IRIS CYST		0	0.0%	1	8.3%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		1	5.3%	0	0.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		1	5.3%	0	0.0%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	5.3%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX		1	5.3%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES		1	5.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		2	10.5%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		0	0.0%	1	8.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		0	0.0%	1	8.3%	0	
OTHER							
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	10.5%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		8	42.1%	8	66.7%	0	

OTTERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OTTERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT OTTERHOUND

Diagnostic Name		Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
		7				2		0	
		#	%	#	%	#	%	#	%
UVEA									
93.120	IRIS CYST	0	0.0%	1	50.0%	0		0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	14.3%	0	0.0%	0		0	
LENS									
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	50.0%	0		0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	50.0%	0		0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	0	0.0%	2	100.0%	0		0	
NORMAL									
.000	NORMAL GLOBE	7	100.0%	0	0.0%	0		0	

PAPILLON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinal atrophy (<i>CNGB1</i>)	Autosomal recessive	1, 2-5	NO	Mutation in the <i>CNGB1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Nuclear and posterior cortical cataracts have been reported in the Papillon.

E. Vitreous degeneration

A liquefaction of the vitreous gel, which may predispose to retinal detachment resulting in blindness.

F. Retinal atrophy - *CNGB1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In one study of 707 dogs in Sweden, an autosomal recessive mode of inheritance was suggested. Clinical onset is reported at 5-6 years of age. In approximately 70% of cases of PRA in the Papillon, a *CNGB1* mutation is present, leading to an abnormal *CNGA1* protein in the rod outer segments. The mode of transmission is autosomal recessive. A genetic test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Haakanson N, Narfstrom K. Progressive retinal atrophy in Papillon dogs in Sweden: A clinical survey. *Prog Vet Comp Ophthalmol*. 1995;5:83.
3. Narfstrom K, Ekestén B. Electroretinographic evaluation of Papillons with and without hereditary retinal degeneration. *Am J Vet Res*. 1998;59:221-226.
4. Ahonen SJ, Arumilli M, Lohi H. A *CNGB1* frameshift mutation in Papillon and Phalene dogs with progressive retinal atrophy. *PLoS One*. 2013;8:e72122.
5. Winkler PA, Ekenstedt KJ, Occelli LM, et al. A large animal model for *CNGB1* autosomal recessive retinitis pigmentosa. *PLoS One*. 2013;8:e72229.

OCULAR DISORDERS REPORT

PAPILLON

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 10,887		2017-2021 1,443		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			9	0.1%	1	0.1%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			16	0.1%	6	0.4%	0	
25.110 DISTICHIASIS			147	1.4%	32	2.2%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			5	0.0%	5	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	1	0.1%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			5	0.0%	1	0.1%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	2	0.1%	0	
70.700 CORNEAL DYSTROPHY			106	1.0%	28	1.9%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	1	0.1%	0	
93.120 IRIS CYST			4	0.0%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			334	3.1%	46	3.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.1%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			9	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			6	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			15	0.1%	6	0.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.0%	4	0.3%	0	
93.810 UVEAL MELANOMA			0	0.0%	4	0.3%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			0	0.0%	1	0.1%	0	
97.120 COLOBOMA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			19	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			357	3.3%	64	4.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			75	0.7%	29	2.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			20	0.2%	10	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			12	0.1%	4	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			7	0.1%	5	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			16	0.1%	3	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			28	0.3%	14	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			18	0.2%	11	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			86	0.8%	12	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			53	0.5%	10	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			33	0.3%	8	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			6	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			10	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			22	0.2%	5	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			13	0.1%	1	0.1%	0	

OCULAR DISORDERS REPORT PAPILLON

Year Examined: Total # Dogs:		1991-2016 10,887		2017-2021 1,443		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.0%	3	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	5	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	2	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	3	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.1%	2	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	45	0.4%	5	0.3%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	5	0.0%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	479	4.4%	131	9.1%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	38	0.3%	7	0.5%	0	
110.135	PHPV/ PTVL	14	0.1%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	38	0.3%	5	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	282	2.6%	20	1.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	66	0.6%	5	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	13	0.1%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	111	1.0%	10	0.7%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.1%	0	
120.960	RETINOPATHY	2	0.0%	3	0.2%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	8	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	11	0.1%	1	0.1%	0	
130.150	OPTIC DISC COLOBOMA	3	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	77	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	202	1.9%	5	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	87	0.8%	58	4.0%	0	
NORMAL							
.000	NORMAL GLOBE	9,393	86.3%	1,142	79.1%	0	

PARSON RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not define	1	Breeder options	
C.	Cataract	Not defined	1, 2	NO	
D.	Lens luxation	Autosomal recessive	3, 4	NO	Mutation in the <i>ADAMTS17</i> gene
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinal atrophy - generalized	Not defined	1	NO	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	5	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation may result in blinding retinal detachment and/or elevated intraocular pressure (glaucoma) causing vision impairment, pain, and blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

G. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oberbauer AM, Hollingsworth SR, Belanger JM, et al. Inheritance of cataracts and primary lens luxation in Jack Russell Terriers. *Am J Vet Res*. 2008;69:222-227.
3. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.
4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.
5. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT PARSON RUSSELL TERRIER

Year Examined: Total # Dogs:		1991-2016 2,723		2017-2021 254		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	66	2.4%	8	3.1%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	14	0.5%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.4%	0	
93.120	IRIS CYST	2	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	171	6.3%	35	13.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.2%	4	1.6%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	2	0.8%	0	
FUNDUS							
97.120	COLOBOMA	1	0.0%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	85	3.1%	17	6.7%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	0.6%	11	4.3%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.4%	2	0.8%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	2	0.8%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	9	0.3%	6	2.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	6	0.2%	1	0.4%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.2%	5	2.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	16	0.6%	1	0.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	39	1.4%	5	2.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.3%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.5%	5	2.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.3%	2	0.8%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.4%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	1	0.4%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.8%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	11	0.4%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	153	5.6%	44	17.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.2%	4	1.6%	0	
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	0.3%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	36	1.3%	1	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	0.3%	1	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	25	0.9%	0	0.0%	0	

OCULAR DISORDERS REPORT PARSON RUSSELL TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,723		254		0	
			#	%	#	%	#	%
RETINA Continued								
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS		0	0.0%	1	0.4%	0	
120.960	RETINOPATHY		1	0.0%	1	0.4%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		2	0.1%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA		2	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		39	1.4%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		97	3.6%	0	0.0%	0	
900.110	OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		37	1.4%	14	5.5%	0	
NORMAL								
.000	NORMAL GLOBE		2,347	86.2%	173	68.1%	0	

PATTERDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Patterdale Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT PATTERDALE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		1	5.9%	0	0.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		1	5.9%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		1	5.9%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		15	88.2%	3	100.0%	0	

PEKINGESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1-3	Breeder option
B.	Entropion	Not defined	1	Breeder option
C.	Exposure keratopathy syndrome	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Exposure keratopathy syndrome

A corneal disease involving all or part of the cornea, resulting from inadequate blinking. This results from a combination of anatomic features including shallow orbits, exophthalmos, macroblepharon and lagophthalmos. Macroblepharon is defined as an exceptionally large palpebral fissure, macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67.
3. Gelatt KN. Pediatric ophthalmology in small animal practice. *Vet Clin North Am.* 1973;3:321.
4. Priester W. Canine progressive retinal atrophy: Occurrence by age, breed, and sex. *American Journal of Veterinary Research.* 1974;35:571-574.

OCULAR DISORDERS REPORT PEKINGESE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 221		2017-2021 93		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.5%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.9%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			12	5.4%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			21	9.5%	22	23.7%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.9%	0	0.0%	0	
25.110 DISTICHIASIS			23	10.4%	5	5.4%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.5%	1	1.1%	0	
CORNEA								
70.210 PANNUS			7	3.2%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			33	14.9%	14	15.1%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			0	0.0%	1	1.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	1	1.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.5%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			3	1.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	1.4%	2	2.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	1.4%	1	1.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.9%	1	1.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	2	2.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.5%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	2.3%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			3	1.4%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			4	1.8%	1	1.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	1.4%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.5%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.9%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			0	0.0%	1	1.1%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.9%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			27	12.2%	6	6.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.5%	0	0.0%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.5%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			3	1.4%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	1.1%	0	
130.120 OPTIC NERVE HYPOPLASIA			1	0.5%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			6	2.7%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			11	5.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	3.2%	12	12.9%	0	
NORMAL								
.000 NORMAL GLOBE			121	54.8%	49	52.7%	0	

PEMBROKE WELSH CORGI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
C.	Cataract	Not defined	1	NO
D.	Retinal dysplasia	Not defined	1	Breeder option
	- folds			

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Persistent pupillary membranes are a significant problem in this breed with frequent documentation of strands bridging from the iris to the cornea noted on routine screening eye examinations. These may be associated with corneal opacity which may result in vision impairment, thus the recommendation against breeding Pembroke Welsh Corgis with PPM.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT PEMBROKE WELSH CORGI

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 19,937		2017-2021 4,078		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			19	0.1%	2	0.0%	0	
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			3	0.0%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			344	1.7%	52	1.3%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			6	0.0%	4	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			6	0.0%	1	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			3	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			65	0.3%	13	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			67	0.3%	5	0.1%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			0	0.0%	1	0.0%	0	
93.110 IRIS HYPOPLASIA			3	0.0%	3	0.1%	0	
93.120 IRIS CYST			8	0.0%	1	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			8	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			5	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			3	0.0%	3	0.1%	0	
93.180 IRIS SPHINCTER DYSPLASIA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			3,637	18.2%	806	19.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			66	0.3%	15	0.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			401	2.0%	42	1.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			15	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	0.0%	1	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			54	0.3%	39	1.0%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			5	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			79	0.4%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			452	2.3%	98	2.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			77	0.4%	21	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			66	0.3%	13	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			32	0.2%	12	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.0%	1	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			29	0.1%	7	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			70	0.4%	27	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			36	0.2%	25	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			109	0.5%	18	0.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			186	0.9%	19	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			70	0.4%	10	0.2%	0	

OCULAR DISORDERS REPORT PEMBROKE WELSH CORGI

Year Examined: Total # Dogs:		1991-2016 19,937		2017-2021 4,078		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	7	0.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	19	0.1%	3	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	202	1.0%	25	0.6%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	25	0.1%	10	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	7	0.0%	4	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	7	0.0%	9	0.2%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	4	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	15	0.1%	22	0.5%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	1	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.0%	9	0.2%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	77	0.4%	4	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.0%	3	0.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		1,130	5.7%	244	6.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	70	0.4%	25	0.6%	0	
110.135	PHPV/ PTVL	21	0.1%	4	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	1	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	91	0.5%	5	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1,195	6.0%	155	3.8%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	171	0.9%	14	0.3%	0	
120.190	RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	35	0.2%	1	0.0%	0	
120.400	RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	5	0.0%	1	0.0%	0	
120.960	RETINOPATHY	6	0.0%	9	0.2%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	6	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	9	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	125	0.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	313	1.6%	6	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	223	1.1%	106	2.6%	0	
NORMAL							
.000	NORMAL GLOBE	14,218	71.3%	2,782	68.2%	0	

PERRO DE PRESA CANARIO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	1	Breeder option	Mutation in the <i>CNGB3</i> gene

Description and Comments

A. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

References

1. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of *CNGB3* is identical by descent in multiple canine breeds and causes achromatopsia. *BMC Genet.* 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

OCULAR DISORDERS REPORT PERRO DE PRESA CANARIO

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	11.1%	0	0.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	22.2%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	11.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	11.1%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	11.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	11.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			4	44.4%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			1	11.1%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			6	66.7%	5	100.0%	0	

PERUVIAN INCA ORCHID

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT PERUVIAN INCA ORCHID

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	8.7%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	4.3%	1	1.8%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	4.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			0	0.0%	1	1.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	4.3%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	4.3%	3	5.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	4.3%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	4.3%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	4.3%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	4.3%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	4.3%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	4.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			8	34.8%	4	7.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	1.8%	0	
RETINA								
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			0	0.0%	2	3.5%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			0	0.0%	3	5.3%	0	
120.960 RETINOPATHY			0	0.0%	2	3.5%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	4.3%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			0	0.0%	1	1.8%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	2	3.5%	0	
NORMAL								
.000 NORMAL GLOBE			22	95.7%	45	78.9%	0	

PETIT BASSET GRIFFON VENDEEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2-5	NO	Mutation in the <i>ADAMTS17</i> gene
B.	Corneal dystrophy - endothelial	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Not defined	5	NO	Mutation in the <i>ADAMTS17</i> gene
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

Primary Open Angle Glaucoma (POAG) in the Petit Basset Griffon Vendéen is caused by an inversion with a breakpoint disrupting the *ADAMTS17* gene. Pectinate ligament abnormalities are not present on gonioscopy and the iridocorneal angle remains open. The initial clinical features are noted around 3-4 years and include a small rise in intraocular pressure accompanied by lens subluxation. Retinal degeneration and optic nerve cupping noted in late stages when globe enlargement and vision disruption has occurred. A DNA test is available.

B. Corneal dystrophy - endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee, 1999 and/or Data from OFA All-Breeds Report, 1991-1998.
2. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of

- glaucoma. *Canine Genet Epidemiol*. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.
3. Forman OP, Pettitt L, Komaromy AM, et al. A Novel Genome-Wide Association Study Approach Using Genotyping by Exome Sequencing Leads to the Identification of a Primary Open Angle Glaucoma Association Inversion Disrupting *ADAMTS17*; *PLoS one*, 2015: 10(12):e0143546.
 4. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. *Canine Genet Epidemiol*. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.
 5. Bedford, PGC (2017), Open-angle glaucoma in the Petit Basset Griffon Vendéen. *Vet Ophthalmol*, 20: 98-102. doi.10.1111/vop.12369.

OCULAR DISORDERS REPORT PETIT BASSET GRIFFON VENDEEN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,462		2017-2021 243		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			3	0.1%	1	0.4%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			3	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			11	0.4%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			1	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			17	0.7%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			26	1.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			3	0.1%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.1%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			468	19.0%	42	17.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			35	1.4%	1	0.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			213	8.7%	12	4.9%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			15	0.6%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			14	0.6%	11	4.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			61	2.5%	26	10.7%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			111	4.5%	6	2.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			38	1.5%	6	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			7	0.3%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.1%	1	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.2%	1	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			18	0.7%	2	0.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.1%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			21	0.9%	3	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			24	1.0%	2	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			7	0.3%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			6	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.1%	1	0.4%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			12	0.5%	1	0.4%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			4	0.2%	2	0.8%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			12	0.5%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			8	0.3%	2	0.8%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			170	6.9%	19	7.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			12	0.5%	1	0.4%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			4	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			9	0.4%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			110	4.5%	7	2.9%	0	

OCULAR DISORDERS REPORT PETIT BASSET GRIFFON VENDEEN

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,462		243		0	
			#	%	#	%	#	%
RETINA Continued								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		11	0.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		3	0.1%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE		2	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		3	0.1%	1	0.4%	0	
130.150	OPTIC DISC COLOBOMA		1	0.0%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		38	1.5%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		76	3.1%	5	2.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		47	1.9%	4	1.6%	0	
NORMAL								
.000	NORMAL GLOBE		1,584	64.3%	151	62.1%	0	

PHARAOH HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT PHARAOH HOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 400		2017-2021 139		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			7	1.8%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.3%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			3	0.8%	1	0.7%	0	
UVEA								
93.120 IRIS CYST			1	0.3%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.3%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			29	7.3%	15	10.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			1	0.3%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			11	2.8%	5	3.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.3%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			25	6.3%	7	5.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			7	1.8%	1	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.5%	1	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.5%	1	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.3%	1	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	1.3%	2	1.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			2	0.5%	1	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			2	0.5%	1	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.5%	1	0.7%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			4	1.0%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.3%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.3%	1	0.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			33	8.3%	10	7.2%	0	
VITREOUS								
110.320 VITREOUS DEGENERATION SYNERESIS			0	0.0%	1	0.7%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.8%	1	0.7%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			2	0.5%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			3	0.8%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	3	2.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			4	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			7	1.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			4	1.0%	3	2.2%	0	
NORMAL								
.000 NORMAL GLOBE			323	80.8%	104	74.8%	0	

PICARDY SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PICARDY SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT PICARDY SPANIEL

There are no statistics available for this breed

PLOTT

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1-3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Plott is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Plott. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
PLOTT

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		2	100.0%	7	100.0%	0	

POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT POINTER

Year Examined: Total # Dogs:		1991-2016 716		2017-2021 148		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	0.7%	0	0.0%	0	
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS	4	0.6%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	9	1.3%	3	2.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	1.5%	1	0.7%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.7%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	19	2.7%	3	2.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	1	0.7%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.4%	3	2.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	1.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	1	0.7%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	1	0.7%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	15	2.1%	8	5.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	7	1.0%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.4%	1	0.7%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	4	0.6%	1	0.7%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	7	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	6	0.8%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.3%	10	6.8%	0	
NORMAL							
.000	NORMAL GLOBE	645	90.1%	128	86.5%	0	

POLISH LOWLAND SHEEPDOG

(Polski Owczarek Nizinny)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 1 (<i>rcd4</i>)	Autosomal recessive	2	NO	Mutation in the <i>C2orf71</i> or <i>C17H2orf71</i> genes
E.	Ceroid lipofuscinosis	Not defined	3	NO	

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available.

A form of PRA, similar to that found in Gordon and Irish setters, has also been found in the the Polish Lowland Sheepdog. This form of PRA has been referred to as late-onset, slowly progressive PRA (LOPRA). Slight vascular attenuation, first seen between 4.5 -6 years of age precedes tapetal hyperreflectivity. All fundic changes were bilaterally symmetric and progressed slowly eventually causing clinical blindness, bilateral complete vascular attenuation, and tapetal hyperreflectivity by 12 years of age, on average. Almost all affected dogs were homozygous for the *rcd4* mutation in *C17H2orf71* gene. A DNA test is available.

E. Ceroid lipofuscinosis

A systemic metabolic disorder that affects the retina and retinal pigment epithelium with accumulation of lipopigments resulting in retinal degeneration.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Downs LM, Bell JS, Freeman J, et al. Late-onset progressive retinal atrophy in the Gordon and Irish Setter breeds is associated with a frameshift mutation in *C2orf71*. *Anim Genet*. 2012;44:169-177.
3. Narfstrom K, Wrigstad A, Ekesten B, et al. Neuronal ceroid lipofuscinosis: clinical and morphologic findings in nine affected Polish Owczarek Nizinny (PON) dogs. *Vet Ophthalmol*. 2007;10:111-120.

OCULAR DISORDERS REPORT POLISH LOWLAND SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,115		2017-2021 166		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			17	1.5%	5	3.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	1	0.6%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			32	2.9%	6	3.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			2	0.2%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			76	6.8%	19	11.4%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			49	4.4%	6	3.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			12	1.1%	10	6.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			8	0.7%	2	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.2%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.3%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	1	0.6%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.3%	1	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.6%	1	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			4	0.4%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.2%	1	0.6%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	0.3%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.1%	3	1.8%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			3	0.3%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.2%	2	1.2%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			56	5.0%	21	12.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			10	0.9%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			17	1.5%	4	2.4%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			0	0.0%	1	0.6%	0	
120.960 RETINOPATHY			1	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			5	0.4%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			24	2.2%	1	0.6%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.1%	9	5.4%	0	
NORMAL								
.000 NORMAL GLOBE			938	84.1%	110	66.3%	0	

POLISH TATRA SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the POLISH TATRA SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT POLISH TATRA SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		2		0		0	
		#	%	#	%	#	%
LENS							
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	50.0%	0		0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	50.0%	0		0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	2	100.0%	0		0	
NORMAL							
.000	NORMAL GLOBE	1	50.0%	0		0	

POMERANIAN

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - rod-cone dysplasia type 3 (<i>rcd3</i>)	Autosomal recessive	1, 2	NO	Mutation in the <i>PDE6A</i> gene
F.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2, 3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward head conformation that minimizes or eliminates the likelihood of the defect.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress

normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (*rcd3*). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

F. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Pomeranian is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirman J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT POMERANIAN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,210		2017-2021 1,013		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			3	0.2%	3	0.3%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			7	0.6%	61	6.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			53	4.4%	29	2.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.1%	1	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.2%	1	0.1%	0	
70.700 CORNEAL DYSTROPHY			3	0.2%	3	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.2%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	1	0.1%	0	
93.150 IRIS COLOBOMA			0	0.0%	2	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			72	6.0%	85	8.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.2%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			4	0.3%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			6	0.5%	9	0.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	3	0.3%	0	
93.810 UVEAL MELANOMA			1	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	1	0.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			28	2.3%	10	1.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			7	0.6%	4	0.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.2%	2	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.2%	1	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.2%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.2%	4	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.2%	2	0.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			11	0.9%	7	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			8	0.7%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			4	0.3%	3	0.3%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.2%	2	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	3	0.3%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	0.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			11	0.9%	1	0.1%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			1	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			0	0.0%	1	0.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			59	4.9%	31	3.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.2%	1	0.1%	0	
110.135 PHPV/ PTVL			1	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT POMERANIAN

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 1,210		2017-2021 1,013		2021 0	
		#	%	#	%	#	%
VITREOUS Continued							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.3%	3	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	15	1.2%	3	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.3%	4	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	17	1.4%	1	0.1%	0	
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.2%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	
120.960	RETINOPATHY	0	0.0%	2	0.2%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.2%	1	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	10	0.8%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	27	2.2%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	1.0%	32	3.2%	0	
NORMAL							
.000	NORMAL GLOBE	996	82.3%	777	76.7%	0	

POODLE (Standard)

*Up until 2022, the toy/minature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 10-20	NO	Mutation in the <i>prcd</i> gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (<i>rcd4</i>)	Autosomal recessive	21	NO	Mutation in the <i>C2orf71</i> gene
I.	Day blindness/retinal degeneration	Autosomal recessive	1	NO	Mutation has not been published
J.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

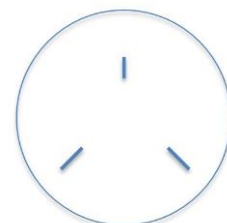
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

H. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Day blindness/tetinal degeneration

An autosomal recessive disorder of standard poodles and 'Doodles' (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

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OCULAR DISORDERS REPORT

POODLE, STANDARD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 17,556		2017-2021 25,308		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.0%	0	0.0%	0	
10.000 GLAUCOMA			4	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			0	0.0%	4	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			60	0.3%	84	0.3%	0	
22.000 ECTROPION, UNSPECIFIED			0	0.0%	4	0.0%	0	
25.110 DISTICHIASIS			268	1.5%	384	1.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			20	0.1%	16	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			8	0.0%	4	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			4	0.0%	0	0.0%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			44	0.3%	16	0.1%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			4	0.0%	4	0.0%	0	
70.700 CORNEAL DYSTROPHY			88	0.5%	128	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			12	0.1%	0	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			0	0.0%	4	0.0%	0	
93.110 IRIS HYPOPLASIA			0	0.0%	4	0.0%	0	
93.120 IRIS CYST			8	0.0%	4	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			448	2.6%	608	2.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			8	0.0%	12	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			8	0.0%	4	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			424	2.4%	612	2.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			12	0.1%	8	0.0%	0	
93.810 UVEAL MELANOMA			12	0.1%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1,352	7.7%	1,080	4.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			720	4.1%	592	2.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			148	0.8%	92	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			160	0.9%	148	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			96	0.5%	76	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			236	1.3%	136	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			108	0.6%	104	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			264	1.5%	292	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			132	0.8%	176	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			92	0.5%	112	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			116	0.7%	124	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.0%	20	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			36	0.2%	40	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			60	0.3%	52	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			40	0.2%	44	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			16	0.1%	36	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			16	0.1%	24	0.1%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			24	0.1%	20	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			12	0.1%	20	0.1%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	8	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			132	0.8%	212	0.8%	0	

OCULAR DISORDERS REPORT POODLE, STANDARD

Year Examined: Total # Dogs:		1991-2016 17,556		2017-2021 25,308		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.1%	12	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	4	0.0%	4	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		2,428	13.8%	2,344	9.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	56	0.3%	36	0.1%	0	
110.135	PHPV/ PTVL	8	0.0%	12	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	8	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	32	0.2%	56	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	72	0.4%	100	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	8	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	4	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	16	0.1%	24	0.1%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	8	0.0%	0	0.0%	0	
120.960	RETINOPATHY	28	0.2%	16	0.1%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	4	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	64	0.4%	84	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.0%	4	0.0%	0	
OTHER							
900.100	OTHER, NOT INHERITED	48	0.3%	52	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	864	4.9%	992	3.9%	0	
NORMAL							
.000	NORMAL GLOBE	13,608	77.5%	20,688	81.7%	0	

POODLE

(Miniature and Toy varieties)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 5-15	NO	Mutation in the <i>prcd</i> gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (<i>rcd4</i>)	Autosomal recessive	16-20	NO	Mutation in the <i>C2orf71</i> gene *only in Miniatures
i.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

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A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

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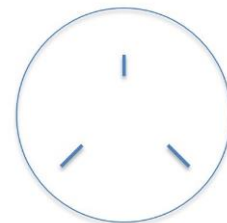
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A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

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19. Barnett KC. Two forms of hereditary and progressive retinal atrophy in the dog. I. The Miniature Poodle. II. The Labrador retriever. *J Am Anim Hosp Assoc.* 1965:234-245.
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OCULAR DISORDERS REPORT POODLE, TOY AND MINIATURE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 10,484		2017-2021 17,520		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	20	0.1%	0	
EYELIDS								
20.140 ECTOPIC CILIA			16	0.2%	24	0.1%	0	
21.000 ENTROPION, UNSPECIFIED			8	0.1%	16	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			0	0.0%	4	0.0%	0	
25.110 DISTICHIASIS			1,072	10.2%	1,976	11.3%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			12	0.1%	48	0.3%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			4	0.0%	4	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			0	0.0%	8	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			16	0.2%	12	0.1%	0	
70.700 CORNEAL DYSTROPHY			40	0.4%	108	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	4	0.0%	0	
93.120 IRIS CYST			0	0.0%	4	0.0%	0	
93.150 IRIS COLOBOMA			4	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	4	0.0%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			4	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			960	9.2%	1,824	10.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			40	0.4%	72	0.4%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			16	0.2%	4	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			136	1.3%	312	1.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	8	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			4	0.0%	4	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			536	5.1%	524	3.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			272	2.6%	236	1.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			96	0.9%	92	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			40	0.4%	64	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			8	0.1%	12	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			176	1.7%	124	0.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			12	0.1%	36	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			104	1.0%	128	0.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			100	1.0%	112	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			116	1.1%	68	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			36	0.3%	40	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.0%	16	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			28	0.3%	68	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			12	0.1%	20	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			24	0.2%	12	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			56	0.5%	24	0.1%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			56	0.5%	28	0.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			8	0.1%	16	0.1%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			4	0.0%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			4	0.0%	4	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	4	0.0%	0	

OCULAR DISORDERS REPORT POODLE, TOY AND MINIATURE

Year Examined: Total # Dogs:		1991-2016 10,484		2017-2021 17,520		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.327	INCOMPLETE CATARACT, CAPSULAR	8	0.1%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	72	0.7%	168	1.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	44	0.4%	24	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	8	0.1%	4	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,288	12.3%	1,300	7.4%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	60	0.6%	96	0.5%	0	
110.135	PHPV/ PTVL	4	0.0%	16	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	32	0.3%	40	0.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	116	1.1%	124	0.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	20	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.0%	8	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.3%	20	0.1%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	4	0.0%	8	0.0%	0	
120.960	RETINOPATHY	12	0.1%	24	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	176	1.7%	104	0.6%	0	
130.120	OPTIC NERVE HYPOPLASIA	104	1.0%	140	0.8%	0	
130.150	OPTIC DISC COLOBOMA	8	0.1%	32	0.2%	0	
OTHER							
900.100	OTHER, NOT INHERITED	48	0.5%	24	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	412	3.9%	600	3.4%	0	
NORMAL							
.000	NORMAL GLOBE	6,912	65.9%	11,940	68.2%	0	

POODLE

(Unspecified variety)

*Up until 2022, the toy/minature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 10-20	NO	Mutation in the <i>prcd</i> gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (<i>rcd4</i>)	Autosomal recessive	5-9	NO	Mutation in the <i>C2orf71</i> gene *only in Standards & Miniatures
I.	Day blindness/retinal degeneration	Autosomal recessive	1	NO	Mutation has not been published *only in Standards
J.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

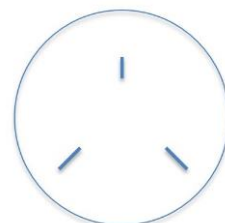
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

H. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Cone degeneration: Day Blindness/Retinal degeneration:

An autosomal recessive disorder of standard poodles and 'Doodles' (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

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8. Barnett KC. Two forms of hereditary and progressive retinal atrophy in the dog. I. The Miniature Poodle. II. The Labrador retriever. *J Am Anim Hosp Assoc*. 1965:234-245.
9. Aguirre GD, Rubin LF. Progressive retinal atrophy in the Miniature Poodle: an electrophysiologic study. *J Am Vet Med Assoc*. 1972;160:191-201.
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OCULAR DISORDERS REPORT POODLE, UNSPECIFIED VARIETY

Year Examined: Total # Dogs:		1991-2016 172,192		2017-2021 4,892		2021 0	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	80	0.0%	16	0.3%	0	
10.000	GLAUCOMA	20	0.0%	0	0.0%	0	
EYELIDS							
20.110	EYELID DERMOID	4	0.0%	0	0.0%	0	
20.140	ECTOPIC CILIA	136	0.1%	4	0.1%	0	
20.160	MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	444	0.3%	12	0.2%	0	
22.000	ECTROPION, UNSPECIFIED	20	0.0%	0	0.0%	0	
25.110	DISTICHIASIS	10,956	6.4%	168	3.4%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	8	0.0%	0	0.0%	0	
40.910	KERATOCONJUNCTIVITIS SICCA	32	0.0%	4	0.1%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	124	0.1%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	72	0.0%	0	0.0%	0	
CORNEA							
70.210	PANNUS	156	0.1%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS	100	0.1%	8	0.2%	0	
70.700	CORNEAL DYSTROPHY	964	0.6%	32	0.7%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	32	0.0%	0	0.0%	0	
UVEA							
90.250	PIGMENTARY UVEITIS	8	0.0%	0	0.0%	0	
93.110	IRIS HYPOPLASIA	4	0.0%	8	0.2%	0	
93.120	IRIS CYST	28	0.0%	0	0.0%	0	
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	20	0.0%	0	0.0%	0	
93.150	IRIS COLOBOMA	20	0.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5,004	2.9%	296	6.1%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	304	0.2%	4	0.1%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	120	0.1%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	156	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	284	0.2%	76	1.6%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	12	0.0%	0	0.0%	0	
93.810	UVEAL MELANOMA	4	0.0%	0	0.0%	0	
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	4	0.1%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	12	0.0%	0	0.0%	0	
97.120	COLOBOMA	44	0.0%	0	0.0%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	1,536	0.9%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8,900	5.2%	112	2.3%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1,652	1.0%	48	1.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	712	0.4%	12	0.2%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	460	0.3%	4	0.1%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	196	0.1%	8	0.2%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	424	0.2%	56	1.1%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	140	0.1%	8	0.2%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	148	0.1%	64	1.3%	0	

OCULAR DISORDERS REPORT

POODLE, UNSPECIFIED VARIETY

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100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	952	0.6%	20	0.4%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	140	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	332	0.2%	4	0.1%	0	
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100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	12	0.0%	0	0.0%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	4	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	4	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	16	0.0%	44	0.9%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	1,672	1.0%	12	0.2%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	4	0.0%	4	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	104	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	12,088	7.0%	392	8.0%	0	
VITREOUS							
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110.320	VITREOUS DEGENERATION SYNERESIS	1,040	0.6%	36	0.7%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	468	0.3%	16	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	80	0.0%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	36	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2,300	1.3%	12	0.2%	0	
120.400	RETINAL HEMORRHAGE	12	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	108	0.1%	0	0.0%	0	
120.960	RETINOPATHY	16	0.0%	8	0.2%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	456	0.3%	8	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	768	0.4%	20	0.4%	0	
130.150	OPTIC DISC COLOBOMA	192	0.1%	8	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1,732	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	3,500	2.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	852	0.5%	228	4.7%	0	
NORMAL							
.000	NORMAL GLOBE	140,784	81.8%	3,788	77.4%	0	

PORCELAINE HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORCELAINE HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

PORCELAINE HOUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	2.5%	0	
NORMAL .000 NORMAL GLOBE		9	100.0%	39	97.5%	0	

PORTUGUESE PODENGO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORTUGUESE PODENGO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT PORTUGUESE PODENGO

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	49		8		0	
			#	%	#	%	#	%
EYELIDS								
20.140	ECTOPIC CILIA		1	2.0%	0	0.0%	0	
25.110	DISTICHIASIS		1	2.0%	0	0.0%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		3	6.1%	0	0.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	4.1%	0	0.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	2.0%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		0	0.0%	1	12.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	1	12.5%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		1	2.0%	2	25.0%	0	
VITREOUS								
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	2.0%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		1	2.0%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		0	0.0%	2	25.0%	0	
120.960	RETINOPATHY		1	2.0%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		1	2.0%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	4.1%	0	0.0%	0	
NORMAL								
.000	NORMAL GLOBE		43	87.8%	5	62.5%	0	

PORTUGUESE PODENGO PEQUENO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 3 (<i>rcd3</i>)	Autosomal recessive	1	NO	Mutation in the <i>PDE6A</i> gene
E.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Portuguese Podengo Pequeno is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (*rcd3*). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Other forms of retinal degeneration that are not *prcd* are recognized in the Portuguese Podengo Pequeno. The currently available genetic test will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.
2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT PORTUGUESE PODENGO PEQUENO

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		202		224		0		
		#	%	#	%	#	%	
EYELIDS								
20.140	ECTOPIC CILIA	0	0.0%	1	0.4%	0		
25.110	DISTICHIASIS	8	4.0%	15	6.7%	0		
CORNEA								
70.700	CORNEAL DYSTROPHY	0	0.0%	4	1.8%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	5.4%	12	5.4%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.5%	0	0.0%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.4%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	3.5%	10	4.5%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	1.0%	2	0.9%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0		
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	1.5%	5	2.2%	0		
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.5%	0	0.0%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.5%	1	0.4%	0		
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.5%	1	0.4%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.5%	1	0.4%	0		
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	2.0%	1	0.4%	0		
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	1.0%	1	0.4%	0		
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.5%	0	0.0%	0		
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.5%	1	0.4%	0		
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	5	2.2%	0		
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.5%	0	0.0%	0		
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.4%	0		
100.328	Y-SUTURE TIP OPACITIES	1	0.5%	2	0.9%	0		
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.5%	0	0.0%	0		
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.5%	0	0.0%	0		
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	1.5%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	21	10.4%	22	9.8%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.5%	1	0.4%	0		
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	1.5%	3	1.3%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	9	4.5%	3	1.3%	0		
RETINA								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.4%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	2.0%	1	0.4%	0		
120.960	RETINOPATHY	2	1.0%	1	0.4%	0		
OTHER								
900.100	OTHER, NOT INHERITED	0	0.0%	1	0.4%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	3.0%	8	3.6%	0		
NORMAL								
.000	NORMAL GLOBE	153	75.7%	168	75.0%	0		

PORTUGUESE POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORTUGUESE POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT PORTUGUESE POINTER

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	11		0		0	
		#	%	#	%	#	%
LENS							
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	9.1%	0		0		
100.316 INCIPIENT CATARACT, NUCLEUS	1	9.1%	0		0		
<i>100.345 SIGNIFICANT CATARACTS (SUMMARY)</i>	2	18.2%	0		0		
NORMAL							
.000 NORMAL GLOBE	9	81.8%	0		0		

PORTUGUESE WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Autosomal recessive	1-3	NO	Mutation is not yet published
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy - early onset	Autosomal recessive	4	NO	Mutation in the <i>CCDC66</i> gene
	- <i>prcd</i>	Autosomal recessive	5, 6	NO	Mutation in the <i>prcd</i> gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

This is a congenital abnormality present bilaterally and characterized by a small globe and associated ocular defects which can affect the cornea, anterior chamber, lens and/or retina. These associated defects may be variable in severity. Several cases have been identified, all of which appeared to have a common ancestry. All affected animals so far identified have been the progeny of dogs that were phenotypically normal, suggesting that the defect is not dominantly inherited.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not

been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Portuguese Water Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

A second, earlier onset form of PRA has also been identified recently in the Portuguese Water Dog. The onset of visual deficits occurs at 2-3 years of age, and, dogs show advanced retinal degeneration at the time visual deficits are recognized. The condition appears inherited as autosomal recessive. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Case records (1986-1994), Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania.
3. Shaw, G. C., et al. (2019). "Microphthalmia With Multiple Anterior Segment Defects in Portuguese Water Dogs." *Vet Pathol* **56**(2): 269-273. PMID: 30131012
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OCULAR DISORDERS REPORT PORTUGUESE WATER DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 30,735		2017-2021 8,562		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			18	0.1%	15	0.2%	0	
10.000 GLAUCOMA			6	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			3	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			56	0.2%	18	0.2%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			1,129	3.7%	261	3.0%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	3	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			6	0.0%	5	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			4	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.0%	3	0.0%	0	
70.700 CORNEAL DYSTROPHY			219	0.7%	123	1.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			6	0.0%	1	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			2	0.0%	5	0.1%	0	
93.120 IRIS CYST			10	0.0%	2	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			2	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			2	0.0%	0	0.0%	0	
93.180 IRIS SPHINCTER DYSPLASIA			0	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1,895	6.2%	677	7.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			42	0.1%	18	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			34	0.1%	2	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			43	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			45	0.1%	52	0.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			8	0.0%	6	0.1%	0	
93.810 UVEAL MELANOMA			6	0.0%	2	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			2	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			69	0.2%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2,022	6.6%	546	6.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			493	1.6%	352	4.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			108	0.4%	61	0.7%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			82	0.3%	33	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			53	0.2%	20	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			85	0.3%	47	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			27	0.1%	16	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			80	0.3%	70	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			124	0.4%	54	0.6%	0	

OCULAR DISORDERS REPORT PORTUGUESE WATER DOG

Year Examined: Total # Dogs:		1991-2016 30,735		2017-2021 8,562		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	92	0.3%	27	0.3%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	96	0.3%	38	0.4%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	14	0.0%	1	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	19	0.1%	6	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	23	0.1%	9	0.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	25	0.1%	16	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	11	0.0%	12	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	13	0.0%	6	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	7	0.1%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	3	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	51	0.2%	68	0.8%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	70	0.2%	12	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	2	0.0%	1	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	11	0.0%	3	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,544	5.0%	859	10.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	47	0.2%	17	0.2%	0	
110.135	PHPV/ PTVL	18	0.1%	2	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.0%	7	0.1%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	40	0.1%	11	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	250	0.8%	77	0.9%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	19	0.1%	3	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	174	0.6%	4	0.0%	0	
120.400	RETINAL HEMORRHAGE	8	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	3	0.0%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	6	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	14	0.0%	6	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	11	0.0%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	6	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	313	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	535	1.7%	5	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	352	1.1%	289	3.4%	0	
NORMAL							
.000	NORMAL GLOBE	25,695	83.6%	6,534	76.3%	0	

PUDELPOINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUDELPOINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

PUDELPOINTER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
OTHER 900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	33.3%	0	0.0%	0	
NORMAL .000 NORMAL GLOBE		2	66.7%	6	100.0%	0	

PUG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Pigmentary Keratitis/Pigmentary Keratopathy	Not defined	1-3	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1, 4	NO
F.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Pug, entropion usually involves the medial canthal margin of the lower eyelid(s).

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Exposure/pigmentary keratitis/pigmentary keratopathy

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

The breed standard indicates the Pug should have a "large massive round head with very large, bold and prominent eyes." These characteristics give rise to the ocular exposure and irritative problems common in the breed.

Pigmentary keratopathy is a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated in some studies with low tear production (STT) and medial eyelid entropion.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

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OCULAR DISORDERS REPORT PUG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,708		2017-2021 836		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			3	0.1%	0	0.0%	0	
EYELIDS								
20.110 EYELID DERMOID			1	0.0%	0	0.0%	0	
20.140 ECTOPIC CILIA			14	0.5%	2	0.2%	0	
20.160 MACROPALPEBRAL FISSURE			67	2.5%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			489	18.1%	129	15.4%	0	
22.000 ECTROPION, UNSPECIFIED			11	0.4%	0	0.0%	0	
25.110 DISTICHIASIS			241	8.9%	51	6.1%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			8	0.3%	1	0.1%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			80	3.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			855	31.6%	388	46.4%	0	
70.700 CORNEAL DYSTROPHY			14	0.5%	1	0.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			0	0.0%	1	0.1%	0	
93.120 IRIS CYST			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			2	0.1%	1	0.1%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			277	10.2%	106	12.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			8	0.3%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			16	0.6%	2	0.2%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	0.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			8	0.3%	2	0.2%	0	
FUNDUS								
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			56	2.1%	11	1.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			10	0.4%	4	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			6	0.2%	2	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.2%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			8	0.3%	2	0.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			10	0.4%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			4	0.1%	4	0.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			18	0.7%	4	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			18	0.7%	3	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.3%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			8	0.3%	1	0.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			7	0.3%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			3	0.1%	1	0.1%	0	

OCULAR DISORDERS REPORT PUG

Year Examined: Total # Dogs:		1991-2016 2,708		2017-2021 836		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.1%	0	0.0%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	13	0.5%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	134	4.9%	25	3.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	13	0.5%	4	0.5%	0	
110.135	PHPV/ PTVL	3	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	26	1.0%	4	0.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	20	0.7%	1	0.1%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	12	0.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	36	1.3%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	165	6.1%	5	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	102	3.8%	39	4.7%	0	
NORMAL							
.000	NORMAL GLOBE	1,101	40.7%	306	36.6%	0	

PULI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the <i>ADAMTS17</i> gene
D.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2, 4	NO	Mutation in the <i>prcd</i> gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation may result in blinding retinal detachment and/or elevated intraocular pressure (glaucoma) causing vision impairment, pain, and blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

D. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Puli is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet.* 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet.* 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384.
4. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One.* 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT PULI

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016 1,115		2017-2021 173		2021 0	
		#	%	#	%	#	%	
EYELIDS								
20.110	EYELID DERMOID	1	0.1%	0	0.0%	0		
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0		
20.160	MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%	0		
21.000	ENTROPION, UNSPECIFIED	8	0.7%	0	0.0%	0		
25.110	DISTICHIASIS	7	0.6%	0	0.0%	0		
CORNEA								
70.220	PIGMENTARY KERATITIS	5	0.4%	0	0.0%	0		
70.700	CORNEAL DYSTROPHY	18	1.6%	0	0.0%	0		
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0		
UVEA								
93.120	IRIS CYST	1	0.1%	0	0.0%	0		
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	252	22.6%	31	17.9%	0		
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	14	1.3%	0	0.0%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.7%	0	0.0%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.5%	5	2.9%	0		
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0		
LENS								
100.200	CATARACT, UNSPECIFIED	3	0.3%	0	0.0%	0		
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	65	5.8%	6	3.5%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.6%	6	3.5%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.3%	2	1.2%	0		
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.6%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	12	1.1%	2	1.2%	0		
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.4%	1	0.6%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.4%	0	0.0%	0		
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	0.8%	4	2.3%	0		
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.4%	3	1.7%	0		
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.6%	0	0.0%	0		
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0		
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.3%	0	0.0%	0		
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	0	0.0%	0		
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.6%	0		
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	1.7%	0		
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.6%	0		
100.328	Y-SUTURE TIP OPACITIES	3	0.3%	1	0.6%	0		
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.6%	0	0.0%	0		
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	68	6.1%	25	14.5%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	1	0.6%	0		
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0		
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.6%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.1%	0	0.0%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	46	4.1%	5	2.9%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.3%	0	0.0%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.4%	0	0.0%	0		
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0		

OCULAR DISORDERS REPORT PULI

Year Examined:		1991-2016		2017-2021		2021	
Total # Dogs:		1,115		173		0	
Diagnostic Name		#	%	#	%	#	%
RETINA Continued							
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.2%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.2%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.3%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	13	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	46	4.1%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	0.6%	6	3.5%	0	
NORMAL							
.000	NORMAL GLOBE	752	67.4%	116	67.1%	0	

PUMI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUMI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

PUMI

Year Examined: Total # Dogs:		1991-2016 93		2017-2021 67		2021 0	
Diagnostic Name		#	%	#	%	#	%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	1.1%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	3.2%	6	9.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	2.2%	2	3.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	4.3%	2	3.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.1%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	3	4.5%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	1.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	2	2.2%	3	4.5%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	1.1%	1	1.5%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	1.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	2.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	1	1.1%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.1%	2	3.0%	0	
NORMAL							
.000	NORMAL GLOBE	88	94.6%	55	82.1%	0	

PYRENEAN MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PYRENEAN MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT PYRENEAN MASTIFF

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		3		18		0	
		#	%	#	%	#	%
EYELIDS							
21.000 ENTROPION, UNSPECIFIED		1	33.3%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED		2	66.7%	1	5.6%	0	
25.110 DISTICHIASIS		1	33.3%	1	5.6%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		0	0.0%	7	38.9%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	2	11.1%	0	
100.316 INCIPIENT CATARACT, NUCLEUS		0	0.0%	3	16.7%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	3	16.7%	0	
OTHER							
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	1	5.6%	0	
NORMAL							
.000 NORMAL GLOBE		0	0.0%	8	44.4%	0	

PYRENEAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Choroidal hypoplasia	Not defined	1	NO
D.	Retinal dysplasia – folds	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Choroidal hypoplasia

Inadequate development of the choroid present at birth and non-progressive. This condition is more commonly identified in the Collie breed where it is a manifestation of "Collie Eye Anomaly."

D. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and,

in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT PYRENEAN SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 487		2017-2021 257		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	2	0.8%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.4%	0	
25.110 DISTICHIASIS			0	0.0%	2	0.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.2%	1	0.4%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.2%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			2	0.4%	2	0.8%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.2%	2	0.8%	0	
93.150 IRIS COLOBOMA			1	0.2%	1	0.4%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			26	5.3%	6	2.3%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.2%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			18	3.7%	6	2.3%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			13	2.7%	4	1.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			5	1.0%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.4%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.4%	2	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	1.0%	3	1.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.2%	1	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.4%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			7	1.4%	1	0.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			4	0.8%	1	0.4%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.4%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			2	0.4%	1	0.4%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	0.4%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.2%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			33	6.8%	12	4.7%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			5	1.0%	3	1.2%	0	
110.135 PHPV/ PTVL			0	0.0%	4	1.6%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			9	1.8%	6	2.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.2%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.2%	0	0.0%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			0	0.0%	1	0.4%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	0.8%	0	
130.120 OPTIC NERVE HYPOPLASIA			0	0.0%	1	0.4%	0	

OCULAR DISORDERS REPORT PYRENEAN SHEPHERD

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	487		257		0	
		#	%	#	%	#	%	
OTHER								
900.000	OTHER, UNSPECIFIED	9	1.8%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	11	2.3%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.8%	13	5.1%	0		
NORMAL								
.000	NORMAL GLOBE	405	83.2%	208	80.9%	0		

RAT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Farias FH, Johnson GS, Taylor JF, et al. An *ADAMTS17* splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT

RAT TERRIER

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016 293		2017-2021 77		2021 0	
		#	%	#	%	#	%	
EYELIDS								
25.110	DISTICHIASIS		5	1.7%	1	1.3%		0
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		12	4.1%	1	1.3%		0
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		1	0.3%	0	0.0%		0
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		2	0.7%	0	0.0%		0
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		5	1.7%	1	1.3%		0
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	0.3%	0	0.0%		0
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		2	0.7%	0	0.0%		0
100.306	PUNCTATE CATARACT, NUCLEUS		1	0.3%	0	0.0%		0
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		3	1.0%	0	0.0%		0
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		3	1.0%	0	0.0%		0
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		2	0.7%	1	1.3%		0
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		1	0.3%	0	0.0%		0
100.316	INCIPIENT CATARACT, NUCLEUS		1	0.3%	0	0.0%		0
100.328	Y-SUTURE TIP OPACITIES		1	0.3%	0	0.0%		0
100.330	GENERALIZED/ COMPLETE CATARACT		5	1.7%	0	0.0%		0
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		6	2.0%	0	0.0%		0
100.345	SIGNIFICANT CATARACTS (SUMMARY)		20	6.8%	1	1.3%		0
VITREOUS								
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		2	0.7%	1	1.3%		0
110.320	VITREOUS DEGENERATION SYNERESIS		3	1.0%	0	0.0%		0
RETINA								
120.190	RETINAL DYSPLASIA, DETACHED		2	0.7%	0	0.0%		0
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		1	0.3%	0	0.0%		0
OTHER								
900.000	OTHER, UNSPECIFIED		3	1.0%	0	0.0%		0
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		3	1.0%	1	1.3%		0
NORMAL								
.000	NORMAL GLOBE		256	87.4%	72	93.5%		0

REDBONE COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the REDBONE COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT REDBONE COONHOUND

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	26		39		0	
			#	%	#	%	#	%
EYELIDS								
21.000	ENTROPION, UNSPECIFIED		0	0.0%	2	5.1%	0	
25.110	DISTICHIASIS		0	0.0%	1	2.6%	0	
NICTITANS								
52.110	PROLAPSED GLAND OF THE THIRD EYELID		0	0.0%	1	2.6%	0	
UVEA								
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		1	3.8%	0	0.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	2	5.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		0	0.0%	1	2.6%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		0	0.0%	1	2.6%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		0	0.0%	2	5.1%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		0	0.0%	1	2.6%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		1	3.8%	0	0.0%	0	
120.960	RETINOPATHY		0	0.0%	1	2.6%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	3.8%	1	2.6%	0	
NORMAL								
.000	NORMAL GLOBE		24	92.3%	31	79.5%	0	

RHODESIAN RIDGEBACK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Entropion	Not defined	2	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

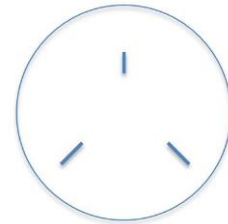
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Breed club request to ACVO Genetics Committee, 2008.

OCULAR DISORDERS REPORT RHODESIAN RIDGEBACK

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,792		2017-2021 1,466		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			0	0.0%	1	0.1%	0	
21.000 ENTROPION, UNSPECIFIED			15	0.3%	3	0.2%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			139	2.9%	31	2.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			5	0.1%	2	0.1%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			6	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			27	0.6%	9	0.6%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			5	0.1%	1	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			4	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			281	5.9%	76	5.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			71	1.5%	65	4.4%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			5	0.1%	0	0.0%	0	
93.810 UVEAL MELANOMA			3	0.1%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	1	0.1%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.1%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			225	4.7%	49	3.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			20	0.4%	5	0.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			53	1.1%	18	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			7	0.1%	2	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.0%	3	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			43	0.9%	14	1.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	2	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			25	0.5%	20	1.4%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			7	0.1%	5	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			88	1.8%	22	1.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			12	0.3%	6	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			15	0.3%	5	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			22	0.5%	7	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	3	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.0%	7	0.5%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.1%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	2	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			21	0.4%	16	1.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			3	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT RHODESIAN RIDGEBACK

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		4,792		1,466		0	
			#	%	#	%	#	%
LENS Continued								
100.345 SIGNIFICANT CATARACTS (SUMMARY)			332	6.9%	138	9.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.1%	9	0.6%	0	
110.135 PHPV/ PTVL			1	0.0%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			7	0.1%	3	0.2%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			7	0.1%	2	0.1%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			6	0.1%	5	0.3%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.0%	1	0.1%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.0%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			5	0.1%	2	0.1%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			2	0.0%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			1	0.0%	0	0.0%	0	
130.120 OPTIC NERVE HYPOPLASIA			1	0.0%	0	0.0%	0	
130.150 OPTIC DISC COLOBOMA			5	0.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			51	1.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			92	1.9%	2	0.1%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			58	1.2%	33	2.3%	0	
NORMAL								
.000 NORMAL GLOBE			3,992	83.3%	1,152	78.6%	0	

ROTTWEILER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Uveal cysts	Not defined	1	Breeder option
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Retinal atrophy - generalized	Not defined	1, 2	NO

Description and Comments

A. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions in various breeds.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

A variety of cataracts have been observed in this breed ranging from the posterior polar cataract similar to that in the Golden Retriever and cataracts involving multiple areas of the

nucleus and cortex. Further studies need to be performed as to the exact mode of inheritance, but it is our recommendation that the individually afflicted dog should not be bred.

D. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Bjerkas E. Progressive retinal atrophy in dogs in Norway. *Norsk Veterinaertidsskrift*. 1991;103:601-610.

OCULAR DISORDERS REPORT ROTTWEILER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 15,385		2017-2021 3,015		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			3	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			10	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			124	0.8%	21	0.7%	0	
22.000 ECTROPION, UNSPECIFIED			29	0.2%	3	0.1%	0	
25.110 DISTICHIASIS			90	0.6%	16	0.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			4	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			15	0.1%	2	0.1%	0	
CORNEA								
70.210 PANNUS			3	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			143	0.9%	25	0.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			7	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			11	0.1%	5	0.2%	0	
93.120 IRIS CYST			246	1.6%	69	2.3%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			52	0.3%	11	0.4%	0	
93.170 ANTERIOR CHAMBER CYST			28	0.2%	44	1.5%	0	
93.180 IIRIS SPHINCTER DYSPLASIA			0	0.0%	1	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			121	0.8%	25	0.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			38	0.2%	6	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			52	0.3%	12	0.4%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			8	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			144	0.9%	148	4.9%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			12	0.1%	6	0.2%	0	
93.810 UVEAL MELANOMA			3	0.0%	2	0.1%	0	
95.120 CILIARY BODY CYST			17	0.1%	7	0.2%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			229	1.5%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			921	6.0%	199	6.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			182	1.2%	166	5.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			293	1.9%	49	1.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			12	0.1%	5	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			24	0.2%	10	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			93	0.6%	13	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			42	0.3%	22	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			85	0.6%	50	1.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			119	0.8%	41	1.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			540	3.5%	95	3.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			39	0.3%	9	0.3%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			13	0.1%	2	0.1%	0	

OCULAR DISORDERS REPORT ROTTWEILER

Year Examined: Total # Dogs:		1991-2016 15,385		2017-2021 3,015		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	79	0.5%	15	0.5%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	58	0.4%	8	0.3%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	49	0.3%	16	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.0%	4	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	9	0.1%	10	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	4	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	4	0.0%	2	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	15	0.1%	20	0.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	48	0.3%	3	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,941	12.6%	546	18.1%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	21	0.1%	14	0.5%	0	
110.135	PHPV/ PTVL	8	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	11	0.1%	6	0.2%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	59	0.4%	8	0.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	131	0.9%	24	0.8%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	46	0.3%	11	0.4%	0	
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	179	1.2%	5	0.2%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	
120.960	RETINOPATHY	21	0.1%	12	0.4%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	15	0.1%	5	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	17	0.1%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	137	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	333	2.2%	9	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	264	1.7%	163	5.4%	0	
NORMAL							
.000	NORMAL GLOBE	12,175	79.1%	2,071	68.7%	0	

RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing

vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT RUSSELL TERRIER

Year Examined: Total # Dogs:		1991-2016 367		2017-2021 239		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	12	3.3%	8	3.3%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.4%	0	
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.3%	0	0.0%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.3%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	1	0.3%	0	0.0%	0	
93.150	IRIS COLOBOMA	1	0.3%	0	0.0%	0	
93.180	IIRIS SPHINCTER DYSPLASIA	1	0.3%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	3.3%	21	8.8%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	0.4%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.3%	2	0.8%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	4.4%	17	7.1%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	3.5%	2	0.8%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.5%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.5%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.3%	8	3.3%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	4	1.7%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	4	1.7%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.4%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.4%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.3%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.8%	1	0.4%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.3%	0	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.4%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.4%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	23	6.3%	24	10.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.3%	1	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.5%	1	0.4%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.3%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.3%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.3%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	2	0.5%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	3.0%	13	5.4%	0	
NORMAL							
.000	NORMAL GLOBE	312	85.0%	182	76.2%	0	

RUSSIAN TOY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT RUSSIAN TOY

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		57		71		0		
		#	%	#	%	#	%	
EYELIDS								
25.110	DISTICHIASIS	1	1.8%	0	0.0%	0		
CORNEA								
70.700	CORNEAL DYSTROPHY	1	1.8%	0	0.0%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	7.0%	5	7.0%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	1.8%	11	15.5%	0		
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	1.8%	0	0.0%	0		
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	1.8%	0	0.0%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	5.3%	0	0.0%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	5.3%	0	0.0%	0		
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	1.8%	0	0.0%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	3.5%	0	0.0%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	1	1.8%	1	1.4%	0		
100.328	Y-SUTURE TIP OPACITIES	1	1.8%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	8	14.0%	1	1.4%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	1.8%	0	0.0%	0		
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	5.3%	1	1.4%	0		
110.320	VITREOUS DEGENERATION SYNERESIS	1	1.8%	2	2.8%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	1	1.4%	0		
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	1.4%	0		
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	1	1.4%	0		
120.960	RETINOPATHY	1	1.8%	0	0.0%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	2	3.5%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	5.3%	0	0.0%	0		
NORMAL								
.000	NORMAL GLOBE	41	71.9%	54	76.1%	0		

Russian Tsvetnaya Bolonka (Bolonka Zwetna)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT RUSSIAN TSVETNAYA BOLONKA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 104		2017-2021 24		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	1.0%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	1.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			2	1.9%	0	0.0%	0	
UVEA								
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	1.0%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	4.8%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	1.0%	2	8.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	2.9%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	1.0%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	1.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	2.9%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	1	4.2%	0	
100.328 Y-SUTURE TIP OPACITIES			5	4.8%	1	4.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	1.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			14	13.5%	4	16.7%	0	
VITREOUS								
110.135 PHPV/ PTVL			1	1.0%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			7	6.7%	2	8.3%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			5	4.8%	3	12.5%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			2	1.9%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	1.0%	4	16.7%	0	
NORMAL								
.000 NORMAL GLOBE			87	83.7%	12	50.0%	0	

RUSO-EUROPEAN LAIKA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation in the <i>prcd</i> gene
B.	Glaucoma – POAG	Presumed autosomal recessive	2	NO	Mutation in the <i>ADAMTS10</i> gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Russo-European Laika is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the breed, and extensive breeding studies have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges,

the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Russo-European Laika. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. *PLoS One*. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT RUSO-EUROPEAN LAIKA

There are no statistics available for this breed

ST. BERNARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1, 2	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membrane - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In this breed, entropion is associated with an exceptionally large palpebral fissure.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest

threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
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OCULAR DISORDERS REPORT SAINT BERNARD

Year Examined: Total # Dogs:		1991-2016 257		2017-2021 155		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	21	8.2%	0	0.0%	0	
21.000	ENTROPION, UNSPECIFIED	69	26.8%	33	21.3%	0	
22.000	ECTROPION, UNSPECIFIED	92	35.8%	29	18.7%	0	
25.110	DISTICHIASIS	17	6.6%	5	3.2%	0	
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.4%	0	0.0%	0	
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.4%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.6%	0	
70.700	CORNEAL DYSTROPHY	2	0.8%	0	0.0%	0	
UVEA							
93.120	IRIS CYST	2	0.8%	0	0.0%	0	
93.170	ANTERIOR CHAMBER CYST	1	0.4%	1	0.6%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	24	9.3%	13	8.4%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.4%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.4%	1	0.6%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.4%	0	0.0%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	14	5.4%	8	5.2%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.8%	4	2.6%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	1.2%	3	1.9%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.8%	1	0.6%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.4%	0	0.0%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.8%	1	0.6%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.4%	1	0.6%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	1.2%	2	1.3%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	1.6%	1	0.6%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	1.9%	1	0.6%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	5	1.9%	1	0.6%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.4%	1	0.6%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.6%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.4%	1	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	9	3.5%	1	0.6%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	41	16.0%	19	12.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	1.2%	1	0.6%	0	
110.135	PHPV/ PTVL	1	0.4%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	1.9%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.4%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.4%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	3	1.2%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	9	3.5%	1	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	13	5.1%	5	3.2%	0	

OCULAR DISORDERS REPORT

SAINT BERNARD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		257		155		0	
			#	%	#	%	#	%
NORMAL								
.000 NORMAL GLOBE			92	35.8%	80	51.6%	0	

SALUKI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SALUKI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SALUKI

		Year Examined: Total # Dogs:	1991-2016 286		2017-2021 72		2021 0	
Diagnostic Name			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		1	0.3%	4	5.6%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		1	0.3%	0	0.0%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		7	2.4%	4	5.6%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		3	1.0%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS		2	0.7%	0	0.0%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		1	0.3%	0	0.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		17	5.9%	5	6.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		1	0.3%	1	1.4%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		3	1.0%	1	1.4%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		1	0.3%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		1	0.3%	1	1.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		0	0.0%	2	2.8%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		3	1.0%	2	2.8%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		1	0.3%	1	1.4%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		2	0.7%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		1	0.3%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES		0	0.0%	1	1.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		2	0.7%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		15	5.2%	9	12.5%	0	
VITREOUS								
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		6	2.1%	2	2.8%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		2	0.7%	0	0.0%	0	
RETINA								
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		2	0.7%	0	0.0%	0	
OPTIC NERVE								
130.150	OPTIC DISC COLOBOMA		1	0.3%	1	1.4%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		1	0.3%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		5	1.7%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		0	0.0%	3	4.2%	0	
NORMAL								
.000	NORMAL GLOBE		244	85.3%	57	79.2%	0	

SAMOYED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-7	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1, 8	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (<i>RPGR</i>)	X-linked recessive	1, 9, 10	NO	Mutation in the <i>RPGR</i> gene
G.	Retinal dysplasia - folds	Presumed autosomal recessive	1	NO (Breeder option requires Normal genetic test for mutation in <i>COL9A2</i> gene)	Mutation in the <i>COL9A2</i> gene
H.	Retinal dysplasia - folds/geographic/ detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 11-14	NO	Mutation in the <i>COL9A2</i> gene
I.	Uveodermatologic syndrome	Not defined	1, 15, 16	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Samoyed, many of the PPMs identified on routine screening examinations bridge from the iris to the cornea where they may be associated with corneal opacity and vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *RPGR*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Samoyed, one form of PRA, known as *XLPR1*, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Samoyed, the presence of retinal folds may be seen in the heterozygous state described in "I" below. Thus the recommendation against breeding. The breeding advice for

Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is not a carrier of the COL9A2 mutation.

H. Retinal dysplasia - folds with skeletal defects in homozygous affected dogs

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 2 (DRD2) in the Samoyed. A similar condition, DRD1, occurs in the Labrador Retriever. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1,267 bp deletion of COL9A2. A DNA test is available.

I. Uveodermatologic syndrome

Uveodermatologic syndrome in the Samoyed bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechiae) and the peripheral iris and cornea (peripheral anterior synechiae) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. Some veterinary ophthalmologists feel there is a prevalence of this entity in the Samoyed. Additional studies are needed to validate this experience and explore the possibility of a genetic basis.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Ekestén B, Narfström K. Correlation of morphologic features of the iridocorneal angle to intraocular pressure in Samoyeds. *Am J Vet Res.* 1991;52:1875-1878.
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16. Halliwell RE. Autoimmune diseases in domestic animals. *J Am Vet Med Assoc*. 1982;181:1088-1096.

OCULAR DISORDERS REPORT SAMOYED

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 24,138		2017-2021 5,726		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			21	0.1%	2	0.0%	0	
10.000 GLAUCOMA			10	0.0%	1	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			7	0.0%	2	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			6	0.0%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.0%	1	0.0%	0	
25.110 DISTICHIASIS			1,386	5.7%	203	3.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			15	0.1%	11	0.2%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			14	0.1%	4	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			4	0.0%	1	0.0%	0	
CORNEA								
70.210 PANNUS			4	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			2	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			856	3.5%	214	3.7%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			15	0.1%	2	0.0%	0	
UVEA								
93.120 IRIS CYST			10	0.0%	3	0.1%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			478	2.0%	128	2.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			24	0.1%	12	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			37	0.2%	6	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			16	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			10	0.0%	7	0.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			14	0.1%	2	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			2	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	3	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			4	0.0%	0	0.0%	0	
97.120 COLOBOMA			7	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			100	0.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			799	3.3%	181	3.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			117	0.5%	100	1.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			173	0.7%	35	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			15	0.1%	3	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			11	0.0%	10	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			69	0.3%	15	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			32	0.1%	11	0.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			68	0.3%	60	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			90	0.4%	34	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			263	1.1%	45	0.8%	0	

OCULAR DISORDERS REPORT SAMOYED

Year Examined:		1991-2016		2017-2021		2021	
Total # Dogs:		24,138		5,726		0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	29	0.1%	7	0.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	7	0.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	57	0.2%	5	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	40	0.2%	14	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	34	0.1%	19	0.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	13	0.1%	14	0.2%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	3	0.0%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	4	0.1%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	3	0.0%	5	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	10	0.0%	15	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	66	0.3%	0	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	1	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	1,203	5.0%	400	7.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	23	0.1%	10	0.2%	0	
110.135	PHPV/ PTVL	11	0.0%	3	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	2	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	95	0.4%	7	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	492	2.0%	89	1.6%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	186	0.8%	41	0.7%	0	
120.190	RETINAL DYSPLASIA, DETACHED	26	0.1%	6	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	56	0.2%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	
120.960	RETINOPATHY	3	0.0%	7	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	19	0.1%	2	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	14	0.1%	2	0.0%	0	
130.150	OPTIC DISC COLOBOMA	70	0.3%	6	0.1%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	176	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	448	1.9%	8	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	256	1.1%	209	3.7%	0	
NORMAL							
.000	NORMAL GLOBE	19,795	82.0%	4,600	80.3%	0	

SCHAPENDOES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (CCDC66)	Autosomal recessive	2, 3	NO	Mutation in the CCDC66 gene

Description and Comments

- A. A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- B. Retinal atrophy - CCDC66

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

In the Schapendoes the age of onset is between 2-5 years of age. The causal mutation is a single base pair insertion in exon 6 of the gene coiled-coil domain containing 66 (CCDC66) that leads to a stop codon. The mutation is inherited as an autosomal recessive trait. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Dekomien G, Vollrath C, Petrasch-Parwez E, et al. Progressive retinal atrophy in Schapendoes dogs: mutation of the newly identified CCDC66 gene. *Neurogenetics*. 2010 May;11:163-174.
3. Lippmann T, Jonkisz A, Dobosz T, et al. Haplotype-defined linkage region for gPRA in Schapendoes dogs. *Mol Vis*. 2007;13:174-180.

OCULAR DISORDERS REPORT SCHAPENDONES

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			2	2.4%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	1.9%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	1	1.9%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	1.2%	1	1.9%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	3.5%	6	11.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			2	2.4%	5	9.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			0	0.0%	1	1.9%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			0	0.0%	2	3.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	3	5.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	2	3.8%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	1.2%	1	1.9%	0	
100.328 Y-SUTURE TIP OPACITIES			2	2.4%	1	1.9%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			5	5.9%	15	28.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	2.4%	1	1.9%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	1.2%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			0	0.0%	2	3.8%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	1.2%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			6	7.1%	0	0.0%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	2	3.8%	0	
NORMAL								
.000 NORMAL GLOBE			72	84.7%	33	63.5%	0	

SCHIPPERKE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT SCHIPPERKE

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,504		2017-2021 285		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.4%	0	
25.110 DISTICHIASIS			46	3.1%	8	2.8%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.4%	0	
70.700 CORNEAL DYSTROPHY			3	0.2%	1	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			129	8.6%	24	8.4%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			6	0.4%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			10	0.7%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			7	0.5%	1	0.4%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			66	4.4%	11	3.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			17	1.1%	7	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.1%	1	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.4%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	1	0.4%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.1%	1	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			12	0.8%	2	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			23	1.5%	4	1.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			10	0.7%	1	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			8	0.5%	3	1.1%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.4%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			6	0.4%	3	1.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	1	0.4%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	1	0.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	3	1.1%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			8	0.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			105	7.0%	29	10.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.1%	0	0.0%	0	
110.135 PHPV/ PTVL			1	0.1%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			2	0.1%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			19	1.3%	4	1.4%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			10	0.7%	1	0.4%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			4	0.3%	1	0.4%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			16	1.1%	1	0.4%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS			0	0.0%	1	0.4%	0	
120.960 RETINOPATHY			2	0.1%	0	0.0%	0	

OCULAR DISORDERS REPORT SCHIPPERKE

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,504		285		0	
			#	%	#	%	#	%
OTHER								
900.000 OTHER, UNSPECIFIED			16	1.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			51	3.4%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			20	1.3%	16	5.6%	0	
NORMAL								
.000 NORMAL GLOBE			1,204	80.1%	219	76.8%	0	

SCOTTISH DEERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SCOTTISH DEERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SCOTTISH DEERHOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	1	9.1%	0	
EYELIDS								
25.110 DISTICHIASIS			3	17.6%	2	18.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			3	17.6%	3	27.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			0	0.0%	1	9.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	9.1%	0	
LENS								
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	5.9%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	5.9%	0	0.0%	0	
OTHER								
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	5.9%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			14	82.4%	6	54.5%	0	

SCOTTISH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to lens	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
B.	Cataract	Not defined	1	NO
C.	Ligneous conjunctivitis	Not defined	2	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease. Ligneous conjunctivitis has also been reported in one Yorkshire Terrier.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Mason SL, McElroy P, Nuttall T. Ligneous membranitis in Scottish Terriers. Vet Rec. 2012; 171: 160.

OCULAR DISORDERS REPORT SCOTTISH TERRIER

Year Examined: Total # Dogs:		1991-2016 840		2017-2021 158		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	3	0.4%	0	0.0%	0	
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.2%	0	0.0%	0	
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	
70.220	PIGMENTARY KERATITIS	2	0.2%	0	0.0%	0	
70.700	CORNEAL DYSTROPHY	6	0.7%	0	0.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.2%	0	0.0%	0	
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.4%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	249	29.6%	42	26.6%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	43	5.1%	3	1.9%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	10	1.2%	2	1.3%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	84	10.0%	57	36.1%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	6	0.7%	5	3.2%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	79	9.4%	5	3.2%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.8%	3	1.9%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	0	0.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.5%	0	0.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.2%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.5%	1	0.6%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.6%	0	0.0%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.4%	2	1.3%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.7%	2	1.3%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.7%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.2%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	9	1.1%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.2%	2	1.3%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.6%	0	
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	0	0.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.6%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	66	7.9%	11	7.0%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.5%	0	0.0%	0	

OCULAR DISORDERS REPORT SCOTTISH TERRIER

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	840		158		0	
		#	%	#	%	#	%
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS	5	0.6%	0	0.0%	0		
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	1.0%	0	0.0%	0		
OPTIC NERVE							
130.150 OPTIC DISC COLOBOMA	2	0.2%	0	0.0%	0		
OTHER							
900.000 OTHER, UNSPECIFIED	13	1.5%	0	0.0%	0		
900.100 OTHER, NOT INHERITED	60	7.1%	0	0.0%	0		
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	2.4%	9	5.7%	0		
NORMAL							
.000 NORMAL GLOBE	431	51.3%	67	42.4%	0		

SEALYHAM TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	1-5	NO	Mutation in the ADAMTS17 gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to

be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *J Comp Pathol.* 1945;55:168-186.
3. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract.* 1963;4:447-456.
4. Curtis R, Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract.* 1980;21:657-668.
5. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384.

OCULAR DISORDERS REPORT SEALYHAM TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 491		2017-2021 42		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			27	5.5%	2	4.8%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.2%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			31	6.3%	7	16.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.4%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.4%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.2%	2	4.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.2%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			1	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			20	4.1%	1	2.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			4	0.8%	1	2.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.6%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.4%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			3	0.6%	2	4.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.6%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			8	1.6%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.4%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.4%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			7	1.4%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			5	1.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			39	7.9%	3	7.1%	0	
VITREOUS								
110.135 PHPV/ PTVL			2	0.4%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			5	1.0%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			9	1.8%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.2%	0	0.0%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.2%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			11	2.2%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.2%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	1	2.4%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	1	2.4%	0	
130.120 OPTIC NERVE HYPOPLASIA			1	0.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			4	0.8%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			10	2.0%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	0.4%	2	4.8%	0	

OCULAR DISORDERS REPORT SEALYHAM TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		491		42		0	
			#	%	#	%	#	%
NORMAL								
.000 NORMAL GLOBE			412	83.9%	28	66.7%	0	

SEPPALA SIBERIAN SLED DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SEPPALA SIBERIAN SLED DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

SEPPALA SIBERIAN SLED DOG

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
UVEA 93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	1	20.0%	0	
NORMAL .000 NORMAL GLOBE			1	100.0%	4	80.0%	0	

SERBIAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Serbian Hound is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Serbian Hound. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT SERBIAN HOUND

There are no statistics available for this breed

SHETLAND SHEEPDOG

(Sheltie)

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	1. Corneal dystrophy 2. Sheltie corneal dystrophy	Not defined Not defined	1, 2 1, 2	Breeder option NO	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy (<i>CNGA1</i>)	Autosomal recessive	1, 3	NO	Mutation in the <i>CNGA1</i> gene
F.	Slowly progressing retinopathy	Not defined	4	NO	
G.	Choroidal hypoplasia (Collie eye anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 5, 6	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

Distichiasis in the Shetland Sheepdog usually involves stiff lashes which require permanent epilation.

B. 1. Corneal dystrophy

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

2. Sheltie corneal dystrophy

The corneal changes in the Shetland Sheepdog are characterized grossly by multifocal, central, subepithelial and superficial stromal, grey-white, circular or irregular rings. Some affected animals develop corneal erosions. The precocular tear film in the majority of dogs is unstable and requires symptomatic therapy to keep the patients comfortable. Further studies are necessary to define this disorder.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms are seen in the Shetland sheepdog and pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - *CNGA1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

One form of PRA in the Shetland Sheepdog is caused by a 4bp exonic deletion in *CNGA1*. However multiple forms of PRA exist in the breed and slowly progressive retinopathy is also not genetically linked to this mutation. A DNA test is available; however it will only detect this mutation.

F. Slowly progressing retinopathy

A syndrome as yet not well defined. May be a variant of PRA.

G. Choroidal hypoplasia (Collie eye anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract.* 1983;24:63-83.
3. Wiik AC, Ropstad EO, Ekestén B, et al. Progressive retinal atrophy in Shetland Sheepdog is associated with a mutation in the CNGA1 gene. *Anim Genet.* 2015;46:515-521.
4. Karlstam L, Hertel E, Zeiss C, et al. A slowly progressive retinopathy in the Shetland Sheepdog. *Vet Ophthalmol.* 2011;14:227-238.
5. Barnett KC, Stades FC. Collie eye anomaly in the Shetland Sheepdog in the Netherlands. *J Small Anim Pract.* 1979;20:321-329.
6. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res.* 2007;17:1562-1571.
7. Fredholm M, Larsen RC, Jönsson M, Söderlund MA, Hardon T, Proschowsky HF. Discrepancy in compliance between the clinical and genetic diagnosis of choroidal hypoplasia in Danish Rough Collies and Shetland Sheepdogs. *Anim Genet.* 2016 Apr; 47(2): 250-2.

OCULAR DISORDERS REPORT SHETLAND SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 39,533		2017-2021 5,111		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			65	0.2%	6	0.1%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			9	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			7	0.0%	1	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			10	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			2,549	6.4%	248	4.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			6	0.0%	2	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			7	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			7	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			9	0.0%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			5	0.0%	1	0.0%	0	
70.700 CORNEAL DYSTROPHY			1,077	2.7%	126	2.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			35	0.1%	2	0.0%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.110 IRIS HYPOPLASIA			5	0.0%	3	0.1%	0	
93.120 IRIS CYST			20	0.1%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			5	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			26	0.1%	2	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	4	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1,669	4.2%	250	4.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			121	0.3%	8	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			197	0.5%	13	0.3%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			29	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			15	0.0%	7	0.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			20	0.1%	8	0.2%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			4	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			5	0.0%	7	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			128	0.3%	35	0.7%	0	
97.120 COLOBOMA			82	0.2%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			73	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			616	1.6%	110	2.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			94	0.2%	36	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			72	0.2%	18	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			32	0.1%	8	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			12	0.0%	3	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			15	0.0%	4	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			52	0.1%	28	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			42	0.1%	21	0.4%	0	

OCULAR DISORDERS REPORT SHETLAND SHEEPDOG

Year Examined: Total # Dogs:		1991-2016 39,533		2017-2021 5,111		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	146	0.4%	28	0.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	96	0.2%	25	0.5%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	57	0.1%	7	0.1%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.0%	1	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.0%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	37	0.1%	6	0.1%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	36	0.1%	10	0.2%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	6	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	5	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	4	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	1	0.0%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	4	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	6	0.0%	4	0.1%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	46	0.1%	3	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	845	2.1%	222	4.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	93	0.2%	5	0.1%	0	
110.135	PHPV/ PTVL	19	0.0%	3	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	1	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	138	0.3%	19	0.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	90	0.2%	16	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	16	0.0%	6	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	5	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	215	0.5%	8	0.2%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	
120.960	RETINOPATHY	21	0.1%	4	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	18	0.0%	2	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	25	0.1%	1	0.0%	0	
130.150	OPTIC DISC COLOBOMA	193	0.5%	18	0.4%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	243	0.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	571	1.4%	12	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	307	0.8%	186	3.6%	0	
NORMAL							
.000	NORMAL GLOBE	33,403	84.5%	4,092	80.1%	0	

SHIBA INU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in exon 4 plays an important role in the development of glaucoma in the Shiba Inu. A genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

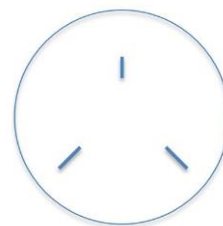
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.
2. Kanemaki N, Tchedre KT, Imayasu M, et al. Dogs and humans share a common susceptibility gene SRBD1 for glaucoma risk. *PLoS one*. 2013;8:e74372.
3. Kato K, Sasaki N, Matsunaga S, et al. Possible association of glaucoma with pectinate ligament dysplasia and narrowing of the iridocorneal angle in Shiba Inu dogs in Japan. *Vet Ophthalmol*. 2006;9:71-75.

OCULAR DISORDERS REPORT SHIBA INU

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 4,628		2017-2021 1,166		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			4	0.1%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			6	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			12	0.3%	0	0.0%	0	
25.110 DISTICHIASIS			110	2.4%	19	1.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			4	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			10	0.2%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			33	0.7%	3	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			10	0.2%	1	0.1%	0	
UVEA								
93.120 IRIS CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			190	4.1%	46	3.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			15	0.3%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	2	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			30	0.6%	42	3.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			3	0.1%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			10	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			194	4.2%	73	6.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			13	0.3%	5	0.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			19	0.4%	9	0.8%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.1%	2	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	1	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			49	1.1%	59	5.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.0%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			8	0.2%	6	0.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			33	0.7%	12	1.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			25	0.5%	4	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			13	0.3%	2	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			15	0.3%	11	0.9%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			4	0.1%	2	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			5	0.1%	2	0.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	2	0.2%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			21	0.5%	65	5.6%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			19	0.4%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			4	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			246	5.3%	184	15.8%	0	

OCULAR DISORDERS REPORT SHIBA INU

Year Examined: Total # Dogs:		1991-2016 4,628		2017-2021 1,166		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	19	0.4%	7	0.6%	0	
110.135	PHPV/ PTVL	4	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	29	0.6%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	7	0.2%	6	0.5%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.0%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	29	0.6%	0	0.0%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	1	0.0%	1	0.1%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	7	0.2%	2	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	31	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	96	2.1%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	47	1.0%	44	3.8%	0	
NORMAL							
.000	NORMAL GLOBE	3,888	84.0%	900	77.2%	0	

SHIH TZU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO
B.	Glaucoma	Not defined	3	NO
C.	Entropion	Not defined	1	Breeder option
D.	Distichiasis	Not defined	1	Breeder option
E.	Ectopic cilia	Not defined	1	Breeder option
F.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
G.	Exposure keratitis	Not defined	1	Breeder option
H.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
I.	Cataract	Not defined	1	NO
J.	Vitreous degeneration - anterior chamber	Not defined	1, 4, 5	Breeder option
K.	Retinal detachment	Not defined	4, 6	NO
L.	Retinal atrophy - generalized	Not defined	1	NO
M.	Optic nerve hypoplasia	Not defined	7	NO
N.	Retinal degeneration	Not defined	6	NO

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in intron 1 plays an important role in the development of glaucoma in the Shih Tzu. A genetic test is not yet available.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

E. Ectopic cilia

Hair emerging through the eyelid conjunctiva. Ectopic cilia occur more frequently in younger dogs and cause discomfort and corneal disease.

F. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

G. Exposure keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

J. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

K. Retinal detachment

A separation of the sensory retina from the underlying tissue. It results in blindness when complete.

L. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

M. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

N. Retinal degeneration

A unilateral or bilateral retinal disease which can be progressive. When bilateral, the ophthalmoscopic lesions are sometimes asymmetrical, particularly in the early stages of the disease. Fundus examination shows initially single or multiple focal retinal lesions that appear active (local infiltrative inflammation or granulation) or inactive. The lesions can progress resulting in widespread retinal atrophy. The end-stage ophthalmoscopic lesions vary and may appear indistinguishable from PRA, or may be more characteristic of an inflammatory retinopathy. The asymmetry of the fundus abnormalities and the presence of inflammatory lesions in the retina and choroid help to differentiate this disorder from PRA. The mode of inheritance of this disease is not known; however, studies of different families suggest that it is possibly inherited. An intriguing aspect of the disease has been the preponderance of affected males compared to females. This has been confirmed in a recent unpublished survey.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Sanchez RF, Innocent G, Mould J, et al. Canine keratoconjunctivitis sicca: disease trends in a review of 229 cases. *J Small Anim Pract.* 2007;48:211-217.
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4. Hendrix DV, Nasisse MP, Cowen P, et al. Clinical signs, concurrent diseases and risk factors associated with retinal detachment in dogs. *Prog Vet Comp Ophthalmol.* 1993;3:87-91.
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6. Itoh Y, Maehara S, Yamasaki A, et al. Investigation of fellow eye of unilateral retinal detachment in Shih-Tzu. *Vet Ophthalmol.* 2010;13:289-293.
7. da Silva EG, Dubielzig R, Zarfoss MK, et al. Distinctive histopathologic features of canine optic nerve hypoplasia and aplasia: a retrospective review of 13 cases. *Vet Ophthalmol.* 2008;11:23-29.

OCULAR DISORDERS REPORT

SHIH TZU

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,729		2017-2021 899		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHTHALMIA			6	0.2%	1	0.1%	0	
EYELIDS								
20.140 ECTOPIC CILIA			41	1.5%	4	0.4%	0	
20.160 MACROPALPEBRAL FISSURE			57	2.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			191	7.0%	106	11.8%	0	
22.000 ECTROPION, UNSPECIFIED			4	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			500	18.3%	106	11.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			6	0.2%	1	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			24	0.9%	5	0.6%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			25	0.9%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			165	6.0%	57	6.3%	0	
70.700 CORNEAL DYSTROPHY			33	1.2%	4	0.4%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			4	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	1	0.1%	0	
93.120 IRIS CYST			5	0.2%	0	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			4	0.1%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			41	1.5%	15	1.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			5	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.1%	2	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.0%	2	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
97.120 COLOBOMA			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			16	0.6%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			64	2.3%	13	1.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			18	0.7%	6	0.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			8	0.3%	4	0.4%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.1%	3	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.1%	1	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			21	0.8%	4	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	1	0.1%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	0.2%	3	0.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			22	0.8%	5	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			20	0.7%	3	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			15	0.5%	2	0.2%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			7	0.3%	2	0.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			8	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	3	0.3%	0	

OCULAR DISORDERS REPORT SHIH TZU

Year Examined: Total # Dogs:		1991-2016 2,729		2017-2021 899		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.2%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.2%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	12	1.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	25	0.9%	1	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	182	6.7%	57	6.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	15	0.5%	6	0.7%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	33	1.2%	9	1.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	143	5.2%	20	2.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	12	0.4%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.1%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	41	1.5%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.3%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.1%	0	
120.960	RETINOPATHY	4	0.1%	0	0.0%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	11	0.4%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	4	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	43	1.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	98	3.6%	5	0.6%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	105	3.8%	96	10.7%	0	
NORMAL							
.000	NORMAL GLOBE	1,611	59.0%	551	61.3%	0	

SHIKOKU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT SHIKOKU

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	1	1.9%	0	
UVEA							
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		6	35.3%	23	44.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		0	0.0%	5	9.6%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	11.8%	2	3.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR		3	17.6%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR		0	0.0%	2	3.8%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		3	17.6%	2	3.8%	0	
OTHER							
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	5.9%	5	9.6%	0	
NORMAL							
.000 NORMAL GLOBE		6	35.3%	22	42.3%	0	

SHILOH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option

Description and Comments

- A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT SHILOH SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 263		2017-2021 80		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			2	0.8%	1	1.3%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	2	2.5%	0	
CORNEA								
70.210 PANNUS			1	0.4%	2	2.5%	0	
70.700 CORNEAL DYSTROPHY			31	11.8%	10	12.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.4%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			2	0.8%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			3	1.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	1.3%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			12	4.6%	1	1.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.8%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.4%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.4%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	1.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.4%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			8	3.0%	1	1.3%	0	
RETINA								
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			2	0.8%	1	1.3%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	0.4%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			4	1.5%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	0.8%	2	2.5%	0	
NORMAL								
.000 NORMAL GLOBE			223	84.8%	64	80.0%	0	

SHORTY BULL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SHORTY BULL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SHORTY BULL

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		2	100.0%	0	

SIBERIAN HUSKY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Presumed autosomal recessive	1, 5-8	NO	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1, 4	NO	
F.	Retinal atrophy (<i>RPGR</i>)	X-linked	1, 9, 10	NO	Mutation in the <i>RPGR</i> gene
G.	Cone degeneration - (achromatopsia)	Autosomal recessive	11, 12	NO	Mutation in the <i>CNGB3</i> gene
H.	Uveodermatologic syndrome	Not defined	1, 13-15	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Siberian Husky, the opacities are bilaterally symmetrical, round to oval and ring shaped. They occur early in life (0.5-2 years) and may progress to cause significant vision loss. When seen, it may be beneficial to feed a low fat diet and recheck the eyes the following year to see if the opacities resolve, ruling out inherited corneal dystrophy.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Siberian Husky, cataracts begin in the axial posterior cortex at approximately one year of age. Progression is variable and vision impairment may occur. In cases with rapid progression, secondary lens-induced uveitis and glaucoma may be associated with partial cataract resorption.

F. Retinal atrophy – (*RPGR*)

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Siberian Husky, one form of PRA, known as XLPR1, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (*CNGB3*) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

H. Uveodermatologic syndrome

Uveodermatologic syndrome in the Siberian Husky bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechia) and the peripheral iris and cornea (peripheral anterior synechia) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Siberian Huskies compared with other dog breeds. Affected dogs are generally young, ranging in age between 1-1/2 to 4 years.

References

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OCULAR DISORDERS REPORT SIBERIAN HUSKY

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 39,132		2017-2021 6,067		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			7	0.0%	0	0.0%	0	
10.000 GLAUCOMA			12	0.0%	4	0.1%	0	
EYELIDS								
20.110 EYELID DERMOID			4	0.0%	0	0.0%	0	
20.140 ECTOPIC CILIA			3	0.0%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			20	0.1%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			4	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			409	1.0%	54	0.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	4	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			22	0.1%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			3	0.0%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			1,017	2.6%	107	1.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			37	0.1%	2	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			3	0.0%	2	0.0%	0	
93.120 IRIS CYST			19	0.0%	3	0.0%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			8	0.0%	1	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			927	2.4%	187	3.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			27	0.1%	2	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			55	0.1%	3	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			6	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			18	0.0%	11	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			17	0.0%	2	0.0%	0	
93.810 UVEAL MELANOMA			1	0.0%	0	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			3	0.0%	1	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			49	0.1%	14	0.2%	0	
97.120 COLOBOMA			16	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			576	1.5%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			717	1.8%	144	2.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			105	0.3%	53	0.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			212	0.5%	28	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			42	0.1%	6	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			12	0.0%	5	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			110	0.3%	17	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			43	0.1%	40	0.7%	0	

OCULAR DISORDERS REPORT SIBERIAN HUSKY

Year Examined: Total # Dogs:		1991-2016 39,132		2017-2021 6,067		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.307	PUNCTATE CATARACT, CAPSULAR	68	0.2%	41	0.7%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	144	0.4%	36	0.6%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1,313	3.4%	120	2.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	71	0.2%	18	0.3%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	18	0.0%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	262	0.7%	5	0.1%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	97	0.2%	15	0.2%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	98	0.3%	33	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	10	0.0%	8	0.1%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	79	0.2%	96	1.6%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	4	0.0%	9	0.1%	0	
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	2	0.0%	1	0.0%	0	
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	7	0.0%	5	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	14	0.0%	26	0.4%	0	
100.327	INCOMPLETE CATARACT, CAPSULAR	7	0.0%	7	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	8	0.0%	16	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	471	1.2%	8	0.1%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	2	0.0%	0	0.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	13	0.0%	2	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	3,775	9.6%	593	9.8%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	50	0.1%	16	0.3%	0	
110.135	PHPV/ PTVL	6	0.0%	1	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	37	0.1%	5	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	92	0.2%	11	0.2%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	54	0.1%	9	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	13	0.0%	1	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	165	0.4%	8	0.1%	0	
120.400	RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	27	0.1%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	4	0.1%	0	
120.960	RETINOPATHY	22	0.1%	29	0.5%	0	
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	7	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	3	0.0%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	354	0.9%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	758	1.9%	7	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	566	1.4%	314	5.2%	0	
NORMAL							
.000	NORMAL GLOBE	33,031	84.4%	4,892	80.6%	0	

SILKEN WINDHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 2	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Choroidal hypoplasia (Collie Eye Anomaly)

- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res.* 2007;17:1562-1571.

OCULAR DISORDERS REPORT SILKEN WINDHOUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 367		2017-2021 442		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	2	0.5%	0	
EYELIDS								
25.110 DISTICHIASIS			4	1.1%	4	0.9%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	0.2%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			1	0.3%	4	0.9%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			0	0.0%	1	0.2%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.3%	1	0.2%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			19	5.2%	11	2.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.3%	2	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.5%	1	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.3%	2	0.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			3	0.8%	2	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.3%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			6	1.6%	3	0.7%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			1	0.3%	5	1.1%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.3%	1	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.5%	3	0.7%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.3%	2	0.5%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			4	1.1%	4	0.9%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			0	0.0%	1	0.2%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			0	0.0%	1	0.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			23	6.3%	29	6.6%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	0.2%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			3	0.8%	3	0.7%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			4	1.1%	6	1.4%	0	
RETINA								
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			3	0.8%	1	0.2%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.3%	2	0.5%	0	
120.960 RETINOPATHY			3	0.8%	2	0.5%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			2	0.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			0	0.0%	1	0.2%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			10	2.7%	20	4.5%	0	
NORMAL								
.000 NORMAL GLOBE			331	90.2%	382	86.4%	0	

SILKY TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1,2	NO	
D.	Vitreous degeneration	Not defined	1	Breeder option	
E.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Silky Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gelatt KN, Samuelson DA, Barrie KP, et al. Biometry and clinical characteristics of congenital cataracts and microphthalmia in the Miniature Schnauzer. *J Am Vet Med Assoc.* 1983;183:99-102.
3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics.* 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT SILKY TERRIER

Year Examined: Total # Dogs:		1991-2016 763		2017-2021 202		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.1%	8	4.0%	0	
25.110	DISTICHIASIS	3	0.4%	0	0.0%	0	
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	1.0%	0	
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.5%	0	
70.700	CORNEAL DYSTROPHY	8	1.0%	0	0.0%	0	
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	55	7.2%	9	4.5%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.4%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	1	0.5%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.3%	0	0.0%	0	
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.3%	1	0.5%	0	
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.5%	0	0.0%	0	
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	39	5.1%	12	5.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	12	1.6%	4	2.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.5%	4	2.0%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	9	1.2%	1	0.5%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.5%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	5	2.5%	0	
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.4%	3	1.5%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	3	1.5%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	1.7%	4	2.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	19	2.5%	4	2.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	11	1.4%	1	0.5%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.4%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.3%	0	0.0%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.5%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.5%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	1	0.5%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.5%	0	
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	4	2.0%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	22	2.9%	1	0.5%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	111	14.5%	39	19.3%	0	
VITREOUS							
110.135	PHPV/ PTVL	0	0.0%	1	0.5%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	4	2.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	33	4.3%	9	4.5%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.5%	1	0.5%	0	

OCULAR DISORDERS REPORT SILKY TERRIER

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	763		202		0	
			#	%	#	%	#	%
RETINA Continued								
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		1	0.1%	1	0.5%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		9	1.2%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	
120.960	RETINOPATHY		0	0.0%	1	0.5%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		1	0.1%	1	0.5%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		12	1.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		24	3.1%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		11	1.4%	10	5.0%	0	
NORMAL								
.000	NORMAL GLOBE		570	74.7%	141	69.8%	0	

SKYE TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SKYE TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT

SKYE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
EYELIDS							
25.110 DISTICHIASIS		1	14.3%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		1	14.3%	0	0.0%	0	
NORMAL							
.000 NORMAL GLOBE		6	85.7%	7	100.0%	0	

SLOUGH1

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>rcd1a</i>)	Autosomal recessive	1	NO	Mutation in the <i>PDE6B</i> gene

Description and Comments

A. Retinal atrophy - *rcd1a*

A later onset degenerative disease of the retinal visual cells with visual deficits detectable at 2 to 3 years of age and which progresses to blindness. This abnormality may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. It is inherited as an autosomal recessive trait.

In the Sloughi, the disease is due to an 8-bp insertion in exon 21 of the *PDE6B* gene causing the *rcd1a* form of PRA. The disease is genetically distinct from that in the Irish Setter and has a later age of onset. A DNA test is available.

References

1. Dekomien G, Runte M, Godde R, et al. Generalized progressive retinal atrophy of Sloughi dogs is due to an 8-bp insertion in exon 21 of the PDE6B gene. *Cytogenet Cell Genet.* 2000;90:261-267.

OCULAR DISORDERS REPORT SLOUGH/2

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 32		2017-2021 54		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	2	3.7%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			1	3.1%	0	0.0%	0	
UVEA								
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			2	6.3%	0	0.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	3.1%	3	5.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			0	0.0%	2	3.7%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			0	0.0%	1	1.9%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			0	0.0%	1	1.9%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	1.9%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			0	0.0%	5	9.3%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	3.1%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			1	3.1%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			31	96.9%	49	90.7%	0	

SLOVAKIAN WIREHAired POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SLOVAKIAN WIREHAired POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SLOVAKIAN WIREHAired POINTER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		1 #	%	1 #	%	0 #	%
EYELIDS							
25.110 DISTICHIASIS		0	0.0%	1 100.0%		0	
NORMAL							
.000 NORMAL GLOBE		1 100.0%		0 0.0%		0	

SMALL MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SMALL MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SMALL MUNSTERLANDER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		18		8		0	
		#	%	#	%	#	%
EYELIDS							
22.000	ECTROPION, UNSPECIFIED	1	5.6%	0	0.0%	0	
25.110	DISTICHIASIS	0	0.0%	1	12.5%	0	
CORNEA							
70.700	CORNEAL DYSTROPHY	2	11.1%	0	0.0%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	5.6%	1	12.5%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	11.1%	1	12.5%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	11.1%	1	12.5%	0	
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	12.5%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	5.6%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	3	16.7%	2	25.0%	0	
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	5.6%	0	0.0%	0	
NORMAL							
.000	NORMAL GLOBE	12	66.7%	5	62.5%	0	

SMOOTH FOX TERRIER*

*The Smooth Fox Terrier and the Wire Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1, 2	NO	
B.	Lens luxation	Autosomal recessive	1, 3-7	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Martin CL and Wyman M. Primary glaucoma in the dog. *Vet Clin North Am.* 1978 May;8:257-286.
3. Lawson DD. Luxation of the crystalline lens in the dog. *J Small Anim Pract.* 1969;10:461.
4. Curtis R and Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract.* 1980 Dec;21:657-668.

5. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract.* 1963;4:447.
6. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *Journal of Comparative Pathology.* 1945;55:168.
7. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT SMOOTH FOX TERRIER

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		284		71		0		
		#	%	#	%	#	%	
CORNEA								
70.700	CORNEAL DYSTROPHY	0	0.0%	1	1.4%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	13	4.6%	6	8.5%	0		
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	1.4%	0		
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	1.4%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.4%	1	1.4%	0		
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.4%	0	0.0%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.1%	0	0.0%	0		
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0		
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.7%	0	0.0%	0		
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.7%	0	0.0%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	5	1.8%	0	0.0%	0		
VITREOUS								
110.320	VITREOUS DEGENERATION SYNERESIS	3	1.1%	1	1.4%	0		
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS	2	0.7%	1	1.4%	0		
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	1.1%	0	0.0%	0		
120.960	RETINOPATHY	0	0.0%	1	1.4%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	1	0.4%	0	0.0%	0		
900.100	OTHER, NOT INHERITED	6	2.1%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.1%	3	4.2%	0		
NORMAL								
.000	NORMAL GLOBE	252	88.7%	57	80.3%	0		

SOFT-COATED WHEATEN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Microphthalmos	Autosomal recessive	2, 3	NO	Mutation in the <i>RBP4</i> gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1, 4 1	Breeder option Passes with no notation	
D.	Cataract	Not defined	1, 4	NO	
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmos

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina. A genetic test is available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Kaukonen M, Woods S, Ahonen S. et al. Maternal inheritance of a recessive RBP for defect in canine congenital eyes disease. *Cell Reports* 2018; 23:2643–2652.
3. Kaukonen M, Woods S, Ahonen S, Lemberg S, Hellman M, Hytönen MK, Permi P, Glaser T, Lohi H. Maternal Inheritance of a Recessive RBP4 Defect in Canine Congenital Eye Disease. *Cell Rep.* 2018 May 29;23(9):2643-2652. doi: 10.1016/j.celrep.2018.04.118. PMID: 29847795; PMCID: PMC6546432.
4. Van der Woerd A. Multiple ocular anomalies in two related litters of Soft-Coated Wheaten Terriers. *Prog Vet Comp Ophthal.* 1995;5:78.

OCULAR DISORDERS REPORT SOFT COATED WHEATEN TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 7,593		2017-2021 1,163		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			0	0.0%	1	0.1%	0	
10.000 GLAUCOMA			2	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			0	0.0%	1	0.1%	0	
20.160 MACROPALPEBRAL FISSURE			1	0.0%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			142	1.9%	33	2.8%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			8	0.1%	2	0.2%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	0.0%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			56	0.7%	5	0.4%	0	
UVEA								
93.120 IRIS CYST			13	0.2%	2	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			3	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			254	3.3%	70	6.0%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			18	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			3	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			56	0.7%	52	4.5%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			6	0.1%	2	0.2%	0	
95.120 CILIARY BODY CYST			3	0.0%	1	0.1%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			0	0.0%	2	0.2%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			17	0.2%	2	0.2%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			24	0.3%	0	0.0%	0	
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			360	4.7%	63	5.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			54	0.7%	28	2.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			11	0.1%	11	0.9%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			17	0.2%	5	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			9	0.1%	8	0.7%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			6	0.1%	5	0.4%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	0.1%	4	0.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			23	0.3%	15	1.3%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			32	0.4%	14	1.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			30	0.4%	8	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			19	0.3%	6	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			19	0.3%	2	0.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			17	0.2%	6	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	5	0.4%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	4	0.3%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.1%	0	

OCULAR DISORDERS REPORT SOFT COATED WHEATEN TERRIER

Year Examined: Total # Dogs:		1991-2016 7,593		2017-2021 1,163		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	2	0.0%	7	0.6%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	35	0.5%	0	0.0%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	1	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	320	4.2%	131	11.3%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	71	0.9%	6	0.5%	0	
110.135	PHPV/ PTVL	6	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	10	0.1%	2	0.2%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	71	0.9%	3	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	0	0.0%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	0.2%	1	0.1%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	2	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	14	0.2%	2	0.2%	0	
130.120	OPTIC NERVE HYPOPLASIA	5	0.1%	2	0.2%	0	
130.150	OPTIC DISC COLOBOMA	9	0.1%	4	0.3%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	49	0.6%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	184	2.4%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	72	0.9%	59	5.1%	0	
NORMAL							
.000	NORMAL GLOBE	6,549	86.3%	883	75.9%	0	

SPANISH GREYHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH GREYHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SPANISH GREYHOUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			2	100.0%	1	100.0%	0	

SPANISH MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT SPANISH MASTIFF

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

SPANISH WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Retinal atrophy - early onset	Autosomal recessive	3	NO	Mutation in the <i>PDE6B</i> gene
	- <i>prcd</i>	Autosomal recessive	2	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Spanish Water Dog is PRCD which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Winkler PA, Ramsey HD, Petersen-Jones SM. A novel mutation in PDE6B in Spanish Water Dogs with early-onset progressive retinal atrophy. *Vet Ophthalmol.* 2020 Sep;23(5):792-796. doi: 10.1111/vop.12792. Epub 2020 Jul 8. PMID: 32639685.
3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics.* 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT SPANISH WATER DOG

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 263		2017-2021 215		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			3	1.1%	3	1.4%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.4%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			3	1.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			0	0.0%	1	0.5%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			9	3.4%	4	1.9%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.4%	1	0.5%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			16	6.1%	9	4.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.4%	1	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.4%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			5	1.9%	9	4.2%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.8%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.8%	1	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.4%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.4%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			0	0.0%	1	0.5%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			13	4.9%	14	6.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.4%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.4%	1	0.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			7	2.7%	1	0.5%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			4	1.5%	1	0.5%	0	
120.190 RETINAL DYSPLASIA, DETACHED			1	0.4%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			8	3.0%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			0	0.0%	2	0.9%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			4	1.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			7	2.7%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			5	1.9%	16	7.4%	0	
NORMAL								
.000 NORMAL GLOBE			214	81.4%	182	84.7%	0	

SPINONE ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder options
D.	Cataract	Not defined	1	NO

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane,

persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT SPINONE ITALIANO

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,142		2017-2021 394		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
EYELIDS								
20.160 MACROPALPEBRAL FISSURE			3	0.1%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			31	1.4%	2	0.5%	0	
22.000 ECTROPION, UNSPECIFIED			13	0.6%	5	1.3%	0	
25.110 DISTICHIASIS			27	1.3%	7	1.8%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			3	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	0.1%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	0.3%	0	
UVEA								
90.250 PIGMENTARY UVEITIS			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			1	0.0%	0	0.0%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			91	4.2%	32	8.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.1%	1	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	1	0.3%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			6	0.3%	3	0.8%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			110	5.1%	22	5.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			13	0.6%	3	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	0.2%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	1	0.3%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			5	0.2%	5	1.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			21	1.0%	5	1.3%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			4	0.2%	6	1.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			14	0.7%	2	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			6	0.3%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.2%	2	0.5%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			5	0.2%	2	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			12	0.6%	4	1.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.2%	3	0.8%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.1%	5	1.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			5	0.2%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			111	5.2%	38	9.6%	0	

OCULAR DISORDERS REPORT SPINONE ITALIANO

Year Examined: Total # Dogs:		1991-2016 2,142		2017-2021 394		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.3%	1	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	14	0.7%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	10	0.5%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.3%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.3%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	22	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	62	2.9%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	1.0%	13	3.3%	0	
NORMAL							
.000	NORMAL GLOBE	1,863	87.0%	304	77.2%	0	

STABYHOUN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the STABYHOUN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT STABYHOUN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	33.3%	0	
LENS								
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	25.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	1	33.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			1	25.0%	1	33.3%	0	
RETINA								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	25.0%	0	0.0%	0	
OTHER								
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	33.3%	0	
NORMAL								
.000 NORMAL GLOBE			3	75.0%	1	33.3%	0	

STAFFORDSHIRE BULL TERRIER*

* Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Autosomal recessive	1-4	NO	Mutation in the <i>HSF4</i> gene
D.	Persistent hyperplastic primary vitreous (PHPV)	Not defined	1, 5, 6	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Staffordshire Bull Terrier, cataracts usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. The condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

D. Persistent hyperplastic primary vitreous (PHPV)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent tunica vasculosa lentis (PTVL) which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The majority of affected dogs have a retrolental fibrovascular plaque and variable lenticular defects which include posterior lenticonus/globus, colobomata, intralenticular hemorrhage and/or secondary cataracts. Vision impairment may result. The disease is an inherited disorder in the breed, but the mode of inheritance has not been defined. The results of current studies cannot rule out autosomal recessive or a dominant trait with incomplete penetrance.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract.* 1978;19:109-120.
3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract.* 1985;26:305-316.
4. Mellersh CS, McLaughlin B, Ahonen S, et al. Mutation in *HSF4* is associated with hereditary cataract in the Australian Shepherd. *Vet Ophthalmol.* 2009;12:372-378.
5. Curtis R, Barnett KC, Leon A. Persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *Vet Rec.* 1984;115:385.
6. Leon A, Curtis R, Barnett K. Hereditary persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *J Am Anim Hosp Assoc.* 1986;22:765-774.

OCULAR DISORDERS REPORT STAFFORDSHIRE BULL TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 922		2017-2021 607		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			78	8.5%	32	5.3%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.2%	0	
70.700 CORNEAL DYSTROPHY			3	0.3%	5	0.8%	0	
UVEA								
93.120 IRIS CYST			5	0.5%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			1	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			23	2.5%	20	3.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.2%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			6	0.7%	17	2.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	1	0.2%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			37	4.0%	16	2.6%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			8	0.9%	11	1.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.3%	3	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			3	0.3%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	0.1%	4	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			5	0.5%	5	0.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.3%	5	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			7	0.8%	5	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.5%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.2%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	0.1%	2	0.3%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.4%	2	0.3%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	3	0.5%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.340 RESORBING/ HYPERMATURE CATARACT			0	0.0%	1	0.2%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			42	4.6%	44	7.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			4	0.4%	3	0.5%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			0	0.0%	1	0.2%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			19	2.1%	4	0.7%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			5	0.5%	5	0.8%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			4	0.4%	2	0.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.1%	2	0.3%	0	
120.960 RETINOPATHY			0	0.0%	1	0.2%	0	
120.970 CMR/ CMR-LIKE RETINOPATY			0	0.0%	1	0.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			9	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			20	2.2%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			16	1.7%	25	4.1%	0	
NORMAL								
.000 NORMAL GLOBE			752	81.6%	479	78.9%	0	

STANDARD SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option
C.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

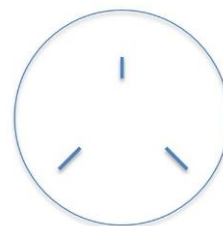
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

There are apparently several forms of cataracts in the Standard Schnauzer: 1) posterior cortex and posterior/total nucleus involvement, with slow progression; 2) dense posterior polar opacity near the sub-capsular region which progresses rapidly to very dense posterior polar plaques in young animals; 3) dense posterior polar opacity like that reported in young animals but found in older animals with variable progression.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT STANDARD SCHNAUZER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,185		2017-2021 641		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
10.000 GLAUCOMA			2	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			66	2.1%	6	0.9%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	0	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			0	0.0%	1	0.2%	0	
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.1%	1	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			2	0.1%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			0	0.0%	1	0.2%	0	
70.700 CORNEAL DYSTROPHY			24	0.8%	4	0.6%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			2	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			15	0.5%	2	0.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			3	0.1%	2	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			2	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			8	0.3%	7	1.1%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			118	3.7%	28	4.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			21	0.7%	14	2.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			8	0.3%	3	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.2%	4	0.6%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			14	0.4%	5	0.8%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			8	0.3%	5	0.8%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			17	0.5%	3	0.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			15	0.5%	5	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			12	0.4%	5	0.8%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			17	0.5%	5	0.8%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			9	0.3%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			4	0.1%	3	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.0%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			6	0.2%	10	1.6%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			13	0.4%	1	0.2%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			162	5.1%	64	10.0%	0	

OCULAR DISORDERS REPORT

STANDARD SCHNAUZER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		3,185		641		0	
			#	%	#	%	#	%
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			3	0.1%	4	0.6%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			5	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			13	0.4%	2	0.3%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			31	1.0%	1	0.2%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			4	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			24	0.8%	0	0.0%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.0%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			5	0.2%	2	0.3%	0	
130.120 OPTIC NERVE HYPOPLASIA			3	0.1%	2	0.3%	0	
130.150 OPTIC DISC COLOBOMA			0	0.0%	1	0.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			31	1.0%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			71	2.2%	1	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			31	1.0%	44	6.9%	0	
NORMAL								
.000 NORMAL GLOBE			2,827	88.8%	527	82.2%	0	

SUSSEX SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent hyaloid artery remnant	Not defined	1	Breeder option
D.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT SUSSEX SPANIEL

		Year Examined: Total # Dogs:		1991-2016 447		2017-2021 74		2021 0	
Diagnostic Name		#	%	#	%	#	%	#	%
EYELIDS									
20.160	MACROPALPEBRAL FISSURE	23	5.1%	0	0.0%	0		0	
21.000	ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0		0	
22.000	ECTROPION, UNSPECIFIED	30	6.7%	3	4.1%	0		0	
25.110	DISTICHIASIS	24	5.4%	6	8.1%	0		0	
NICTITANS									
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0		0	
CORNEA									
70.700	CORNEAL DYSTROPHY	2	0.4%	0	0.0%	0		0	
UVEA									
93.110	IRIS HYPOPLASIA	2	0.4%	1	1.4%	0		0	
93.150	IRIS COLOBOMA	7	1.6%	1	1.4%	0		0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.4%	4	5.4%	0		0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	1.3%	1	1.4%	0		0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0		0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.4%	1	1.4%	0		0	
LENS									
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	3.4%	3	4.1%	0		0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0		0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0		0	
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	1	1.4%	0		0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.4%	0	0.0%	0		0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.4%	0	0.0%	0		0	
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.9%	0	0.0%	0		0	
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.9%	5	6.8%	0		0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	2	2.7%	0		0	
100.328	Y-SUTURE TIP OPACITIES	1	0.2%	0	0.0%	0		0	
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.4%	0	0.0%	0		0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	19	4.3%	8	10.8%	0		0	
VITREOUS									
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	36	8.1%	8	10.8%	0		0	
110.135	PHPV/ PTVL	4	0.9%	0	0.0%	0		0	
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0		0	
RETINA									
120.170	RETINAL DYSPLASIA, FOLDS	43	9.6%	4	5.4%	0		0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.4%	0	0.0%	0		0	
OPTIC NERVE									
130.110	MICROPAPILLA	1	0.2%	0	0.0%	0		0	
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0		0	
130.150	OPTIC DISC COLOBOMA	3	0.7%	0	0.0%	0		0	
OTHER									
900.000	OTHER, UNSPECIFIED	10	2.2%	0	0.0%	0		0	
900.100	OTHER, NOT INHERITED	20	4.5%	0	0.0%	0		0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	1.3%	5	6.8%	0		0	
NORMAL									
.000	NORMAL GLOBE	284	63.5%	47	63.5%	0		0	

SWEDISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Swedish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Swedish Lapphund. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT SWEDISH LAPPHUND

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
UVEA								
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	10.0%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	33.3%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	33.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			1	33.3%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			1	33.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			1	33.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			4	133.3%	0	0.0%	0	
RETINA								
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	33.3%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			0	0.0%	9	90.0%	0	

SWEDISH VALLHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinopathy	Presumed autosomal recessive	1-4	NO	Mutation in the <i>MERTK</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Swedish Vallhund, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinopathy

Swedish Vallhunds have a unique form of retinal degeneration compared to most forms of PRA. The condition is multifocal rather than diffuse and the age of onset and rate of progression vary dramatically, even between littermates. The clinical signs progress in three stages. (A. Komaromy, personal communication 2016)

- Stage one usually occurs between 2-3 years of age and is characterized by mottling or multifocal brown discoloration of the tapetal fundus – this should be marked as retinopathy even though visual deficits are not yet noted.
- In stage two, geographic thinning of the retina can be seen and subtle night vision deficits are observed.
- In stage three, the retinal thinning becomes more generalized with small islands of retinal sparing and deficits are noted in both photopic and scotopic vision. The disease has been associated with a mutation in the *MERTK* gene on canine chromosome 17. Dogs homozygous for the mutation have an 18 fold increased risk of developing the retinopathy. However, the actual causative mutation has not yet been identified.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cooper AE, Ahonen S, Rowlan JS, et al. A novel form of progressive retinal atrophy in Swedish Vallhund dogs. *PloS one*. 2014;9:e106610.
3. Ahonen SJ, Arumilli M, Seppala E, et al. Increased expression of MERTK is associated with a unique form of canine retinopathy. *PloS one*. 2014;9:e114552.
4. Everson R, Pettitt L, Forman OP, et al. An intronic LINE-1 insertion in MRTK is strongly associated with retinopathy in Swedish Vallhund Dogs. *PLoS one*. 2017; 12(8):e0183021

OCULAR DISORDERS REPORT SWEDISH VALLHUND

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	1,508		293		0	
			#	%	#	%	#	%
EYELIDS								
20.140	ECTOPIC CILIA		1	0.1%	0	0.0%	0	
25.110	DISTICHIASIS		38	2.5%	1	0.3%	0	
NASOLACRIMAL								
40.910	KERATOCONJUNCTIVITIS SICCA		1	0.1%	0	0.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		21	1.4%	3	1.0%	0	
UVEA								
93.120	IRIS CYST		5	0.3%	0	0.0%	0	
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM		1	0.1%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		263	17.4%	71	24.2%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		10	0.7%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		3	0.2%	0	0.0%	0	
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS		1	0.1%	0	0.0%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS		6	0.4%	8	2.7%	0	
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS		1	0.1%	0	0.0%	0	
93.810	UVEAL MELANOMA		2	0.1%	0	0.0%	0	
95.120	CILIARY BODY CYST		0	0.0%	1	0.3%	0	
FUNDUS								
97.110	CHOROIDAL HYPOPLASIA		0	0.0%	1	0.3%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		222	14.7%	26	8.9%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX		20	1.3%	10	3.4%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		8	0.5%	2	0.7%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		3	0.2%	3	1.0%	0	
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES		1	0.1%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		33	2.2%	10	3.4%	0	
100.306	PUNCTATE CATARACT, NUCLEUS		34	2.3%	12	4.1%	0	
100.307	PUNCTATE CATARACT, CAPSULAR		7	0.5%	4	1.4%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		20	1.3%	6	2.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		5	0.3%	0	0.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		10	0.7%	0	0.0%	0	
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES		4	0.3%	0	0.0%	0	
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES		6	0.4%	0	0.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		17	1.1%	3	1.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		1	0.1%	1	0.3%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	1	0.3%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX		1	0.1%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES		9	0.6%	7	2.4%	0	
100.330	GENERALIZED/ COMPLETE CATARACT		7	0.5%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		186	12.3%	59	20.1%	0	
VITREOUS								
110.135	PHPV/ PTVL		1	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		10	0.7%	1	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		40	2.7%	5	1.7%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		24	1.6%	2	0.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		4	0.3%	2	0.7%	0	

OCULAR DISORDERS REPORT

SWEDISH VALLHUND

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		1,508		293		0	
			#	%	#	%	#	%
RETINA Continued								
120.190	RETINAL DYSPLASIA, DETACHED		1	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		45	3.0%	2	0.7%	0	
120.960	RETINOPATHY		46	3.1%	11	3.8%	0	
120.970	CMR/ CMR-LIKE RETINOPATY		0	0.0%	1	0.3%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		3	0.2%	2	0.7%	0	
130.150	OPTIC DISC COLOBOMA		1	0.1%	10	3.4%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		47	3.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		72	4.8%	1	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		67	4.4%	15	5.1%	0	
NORMAL								
.000	NORMAL GLOBE		935	62.0%	160	54.6%	0	

TAMASKAN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

- A. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT TAMASKAN

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			1	2.4%	1	1.2%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	2	2.4%	0	
UVEA								
93.120 IRIS CYST			0	0.0%	1	1.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			0	0.0%	2	2.4%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	1.2%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			0	0.0%	1	1.2%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	2.4%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			0	0.0%	1	1.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	1	1.2%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	1	1.2%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	2.4%	0	0.0%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			1	2.4%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			3	7.1%	3	3.5%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	1.2%	0	
RETINA								
120.960 RETINOPATHY			1	2.4%	0	0.0%	0	
OTHER								
900.100 OTHER, NOT INHERITED			0	0.0%	1	1.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	2.4%	3	3.5%	0	
NORMAL								
.000 NORMAL GLOBE			38	90.5%	71	83.5%	0	

TEDDY ROOSEVELT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Teddy Roosevelt Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT

TEDDY ROOSEVELT TERRIER

Diagnostic Name		Year Examined: Total # Dogs:		1991-2016		2017-2021		2021	
		5		3		0			
		#	%	#	%	#	%	#	%
LENS									
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	20.0%	0	0.0%	0		0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	20.0%	0	0.0%	0		0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	20.0%	0	0.0%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		3	60.0%	0	0.0%			0	
VITREOUS									
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	20.0%	0	0.0%	0		0	
OTHER									
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	40.0%	0	0.0%	0		0	
NORMAL									
.000	NORMAL GLOBE	1	20.0%	3	100.0%			0	

TENTERFIELD TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Tenterfield Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT TENTERFIELD TERRIER

There are no statistics available for this breed

TIBETAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT TIBETAN MASTIFF

Diagnostic Name		Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		51		47		0		
		#	%	#	%	#	%	
EYELIDS								
21.000	ENTROPION, UNSPECIFIED	3	5.9%	0	0.0%	0		
22.000	ECTROPION, UNSPECIFIED	0	0.0%	1	2.1%	0		
25.110	DISTICHIASIS	1	2.0%	4	8.5%	0		
CORNEA								
70.700	CORNEAL DYSTROPHY	1	2.0%	0	0.0%	0		
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	9.8%	7	14.9%	0		
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	9.8%	0	0.0%	0		
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	3.9%	1	2.1%	0		
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.0%	0	0.0%	0		
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	2.0%	1	2.1%	0		
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	2.0%	1	2.1%	0		
100.307	PUNCTATE CATARACT, CAPSULAR	1	2.0%	1	2.1%	0		
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	2.0%	0	0.0%	0		
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	4.3%	0		
100.328	Y-SUTURE TIP OPACITIES	1	2.0%	1	2.1%	0		
100.345	SIGNIFICANT CATARACTS (SUMMARY)	6	11.8%	6	12.8%	0		
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	2.1%	0		
OTHER								
900.000	OTHER, UNSPECIFIED	2	3.9%	0	0.0%	0		
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	2.0%	3	6.4%	0		
NORMAL								
.000	NORMAL GLOBE	36	70.6%	34	72.3%	0		

TIBETAN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy <i>FAM161A</i>	Autosomal recessive	1-3	NO	Mutation in the <i>FAM161A</i> gene

Descriptions and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

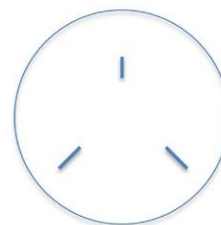
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - *FAM161A*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In most breeds PRA is inherited as an autosomal recessive trait.

In the Tibetan Spaniel, a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3) and appears to be the causative mutation in about 60% of Tibetan Spaniels with PRA. This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in the Tibetan Spaniel.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Bjerkas E. Progressive retinal atrophy in dogs in Norway. *Norsk Veterinaertidsskrift*. 1991;103:601-610.
3. Downs LM, Mellersh CS. An Intronic SINE insertion in *FAM161A* that causes exon-skipping is associated with progressive retinal atrophy in Tibetan Spaniels and Tibetan Terriers. *PLoS One*. 2014;9:e93990.

OCULAR DISORDERS REPORT TIBETAN SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,298		2017-2021 346		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			2	0.1%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			4	0.1%	0	0.0%	0	
20.160 MACROPALPEBRAL FISSURE			5	0.2%	0	0.0%	0	
21.000 ENTROPION, UNSPECIFIED			89	2.7%	3	0.9%	0	
22.000 ECTROPION, UNSPECIFIED			2	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			283	8.6%	19	5.5%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	0	0.0%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			2	0.1%	1	0.3%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			2	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			6	0.2%	1	0.3%	0	
CORNEA								
70.210 PANNUS			8	0.2%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			18	0.5%	4	1.2%	0	
70.700 CORNEAL DYSTROPHY			10	0.3%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.0%	0	0.0%	0	
93.120 IRIS CYST			2	0.1%	1	0.3%	0	
93.150 IRIS COLOBOMA			4	0.1%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			62	1.9%	10	2.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	0.1%	1	0.3%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			4	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			3	0.1%	6	1.7%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	0	0.0%	0	
93.810 UVEAL MELANOMA			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			9	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			81	2.5%	11	3.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			5	0.2%	2	0.6%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			4	0.1%	1	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			2	0.1%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			13	0.4%	4	1.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.0%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			4	0.1%	4	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			21	0.6%	1	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			12	0.4%	1	0.3%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			6	0.2%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			5	0.2%	1	0.3%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			8	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.3%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			1	0.0%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES			9	0.3%	8	2.3%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.0%	0	0.0%	0	

OCULAR DISORDERS REPORT TIBETAN SPANIEL

Year Examined:		1991-2016		2017-2021		2021	
Total # Dogs:		3,298		346		0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	107	3.2%	23	6.6%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	8	0.2%	2	0.6%	0	
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	1	0.3%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	12	0.4%	2	0.6%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	0.3%	0	0.0%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	3	0.9%	0	
120.190	RETINAL DYSPLASIA, DETACHED	2	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.8%	1	0.3%	0	
120.960	RETINOPATHY	2	0.1%	3	0.9%	0	
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	7	0.2%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	32	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	76	2.3%	1	0.3%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	35	1.1%	19	5.5%	0	
NORMAL							
.000	NORMAL GLOBE	2,686	81.4%	267	77.2%	0	

TIBETAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	1, 2-7	NO	Mutation in the <i>ADAMTS17</i> gene
F.	Retinal atrophy <i>FAM161A</i>	Autosomal recessive	1, 3, 8-11	NO	Mutation in the <i>FAM161A</i> gene
G.	Retinal atrophy – <i>prcd</i>	Autosomal recessive	12	NO	Mutation in the <i>prcd</i> gene
G.	Retinal atrophy - Rod-cone dysplasia (<i>rcd4</i>)	Autosomal recessive	14	NO	Mutation in the <i>C2orf71</i> gene
H.	Ceroid lipofuscinosis	Not defined	13, 14	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal atrophy - *FAM161A*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky and Samoyed, in most breeds studied to date, PRA is inherited as an autosomal recessive trait.

There are ERG studies to indicate that there is depression of the B wave at 10-12 weeks of age in the second variety and slower depression in the first variety. Some may have no obvious signs at 5-6 years of age, only to develop clinical signs at 6-7 years of age. It is logical that any animal found with signs of bilateral atrophy should not be bred. Members of the family of the affected animal should be carefully screened. Perhaps, ERG in animals less than 4 years of age is logical, especially if the animal is intended for breed foundation.

In the Tibetan Terrier a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3). This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in

the Tibetan Terrier.

G. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA initially identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A mutation-based gene test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and is of no value in identifying other forms of PRA.

H. Ceroid Lipofuscinosis

An inherited disease of man and animal characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease. In the Tibetan Terrier, moderate visual impairment can occur in low-light conditions.

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OCULAR DISORDERS REPORT TIBETAN TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 8,544		2017-2021 1,049		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.0%	0	0.0%	0	
10.000 GLAUCOMA			3	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			122	1.4%	6	0.6%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			2	0.0%	4	0.4%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	1	0.1%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			4	0.0%	0	0.0%	0	
CORNEA								
70.220 PIGMENTARY KERATITIS			3	0.0%	1	0.1%	0	
70.700 CORNEAL DYSTROPHY			89	1.0%	9	0.9%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.0%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			502	5.9%	74	7.1%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			21	0.2%	1	0.1%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			40	0.5%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			10	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			40	0.5%	40	3.8%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			12	0.1%	4	0.4%	0	
93.810 UVEAL MELANOMA			0	0.0%	1	0.1%	0	
95.120 CILIARY BODY CYST			0	0.0%	1	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			1	0.0%	0	0.0%	0	
97.120 COLOBOMA			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			34	0.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			401	4.7%	63	6.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			118	1.4%	41	3.9%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			45	0.5%	2	0.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			18	0.2%	4	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			17	0.2%	11	1.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			9	0.1%	3	0.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			15	0.2%	10	1.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			26	0.3%	10	1.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			69	0.8%	8	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			70	0.8%	7	0.7%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			37	0.4%	4	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			13	0.2%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			14	0.2%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			11	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.1%	5	0.5%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			6	0.1%	5	0.5%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			3	0.0%	3	0.3%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			2	0.0%	3	0.3%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.0%	1	0.1%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	2	0.2%	0	

OCULAR DISORDERS REPORT TIBETAN TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 8,544		2017-2021 1,049		2021 0	
		#	%	#	%	#	%
LENS Continued							
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	3	0.3%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	38	0.4%	4	0.4%	0	
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.2%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	17	0.2%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	554	6.5%	128	12.2%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.0%	3	0.3%	0	
110.135	PHPV/ PTVL	2	0.0%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.1%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	33	0.4%	1	0.1%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	10	0.1%	3	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.0%	1	0.1%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	124	1.5%	2	0.2%	0	
120.400	RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	
120.960	RETINOPATHY	4	0.0%	6	0.6%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.0%	0	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	4	0.0%	2	0.2%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	82	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	147	1.7%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	69	0.8%	50	4.8%	0	
NORMAL							
.000	NORMAL GLOBE	7,268	85.1%	808	77.0%	0	

TOY AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Iris coloboma	Not defined	1	NO	
D.	Iris hypoplasia	Not defined	1	Breeder option	
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
F.	Cataract	Autosomal co-dominant	1, 7, 8	NO	Mutation in the <i>HSF4-2</i> gene
G.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	1, 9	NO	Mutation in the <i>prcd</i> gene
H.	Cone degeneration - day blindness	Autosomal recessive	10	NO	Mutation in the <i>CNGB3</i> gene
I.	Multifocal retinopathy - <i>cmr1</i>	Autosomal recessive	11	Breeder option	Mutation in the <i>BEST1</i> gene
J.	Choroidal hypoplasia (Collie Eye Anomaly) - Optic nerve coloboma - Retinal detachment - Retinal hemorrhage - Staphyloma/coloboma	Autosomal recessive	1, 12	NO	Mutation in the <i>NHEJ1</i> gene

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form.

D. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the *HSF4-2* mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Toy Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

H. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors (achromatopsia). Affected puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

I. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

- J. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
 - retinal detachment
 - retinal hemorrhage
 - optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

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OCULAR DISORDERS REPORT TOY AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 967		2017-2021 213		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.4%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIAIS			46	4.8%	10	4.7%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			3	0.3%	1	0.5%	0	
UVEA								
93.110 IRIS HYPOPLASIA			16	1.7%	10	4.7%	0	
93.150 IRIS COLOBOMA			18	1.9%	4	1.9%	0	
93.180 IRIS SPHINCTER DYSPLASIA			3	0.3%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			106	11.0%	21	9.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			7	0.7%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			2	0.2%	2	0.9%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			0	0.0%	1	0.5%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.1%	0	0.0%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.1%	0	0.0%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			0	0.0%	1	0.5%	0	
LENS								
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			12	1.2%	3	1.4%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	0.1%	1	0.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.1%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.1%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.2%	2	0.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.1%	3	1.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			4	0.4%	1	0.5%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			1	0.1%	1	0.5%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.2%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.2%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			17	1.8%	8	3.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			5	0.5%	0	0.0%	0	
110.135 PHPV/ PTVL			2	0.2%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			2	0.2%	1	0.5%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			3	0.3%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			1	0.1%	0	0.0%	0	
OPTIC NERVE								
130.110 MICROPAPILLA			10	1.0%	1	0.5%	0	
130.120 OPTIC NERVE HYPOPLASIA			2	0.2%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			6	0.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			8	0.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			7	0.7%	8	3.8%	0	

OCULAR DISORDERS REPORT

TOY AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			818	84.6%	152	71.4%	0	

TOY FOX TERRIER

DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A. Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B. Cataract	Not defined	1	NO	
C. Lens luxation	Autosomal recessive	2	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011 Nov;14:378-384.

OCULAR DISORDERS REPORT TOY FOX TERRIER

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		207		25		0	
			#	%	#	%	#	%
EYELIDS								
25.110	DISTICHIASIS		2	1.0%	0	0.0%	0	
NASOLACRIMAL								
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM		0	0.0%	1	4.0%	0	
CORNEA								
70.700	CORNEAL DYSTROPHY		0	0.0%	1	4.0%	0	
70.730	CORNEAL ENDOTHELIAL DEGENERATION		1	0.5%	0	0.0%	0	
UVEA								
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS		19	9.2%	1	4.0%	0	
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		2	1.0%	0	0.0%	0	
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA		1	0.5%	0	0.0%	0	
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		3	1.4%	1	4.0%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX		0	0.0%	1	4.0%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX		5	2.4%	1	4.0%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX		1	0.5%	1	4.0%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX		0	0.0%	1	4.0%	0	
100.316	INCIPIENT CATARACT, NUCLEUS		0	0.0%	1	4.0%	0	
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX		0	0.0%	2	8.0%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX		0	0.0%	1	4.0%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED		1	0.5%	0	0.0%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		6	2.9%	8	32.0%	0	
VITREOUS								
110.120	PERSISTENT HYALOID ARTERY/ REMNANT		1	0.5%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER		1	0.5%	0	0.0%	0	
110.320	VITREOUS DEGENERATION SYNERESIS		3	1.4%	0	0.0%	0	
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		7	3.4%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		2	1.0%	0	0.0%	0	
OPTIC NERVE								
130.120	OPTIC NERVE HYPOPLASIA		2	1.0%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		2	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		3	1.4%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		6	2.9%	1	4.0%	0	
NORMAL								
.000	NORMAL GLOBE		166	80.2%	20	80.0%	0	

TREEING WALKER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the TREEING WALKER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT TREEING WALKER

Diagnostic Name		Year Examined:	1991-2016		2017-2021		2021	
		Total # Dogs:	7		6		0	
			#	%	#	%	#	%
LENS								
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	14.3%	1	16.7%	0	
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX		1	14.3%	0	0.0%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES		0	0.0%	1	16.7%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)		1	14.3%	1	16.7%	0	
OTHER								
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		2	28.6%	0	0.0%	0	
NORMAL								
.000	NORMAL GLOBE		5	71.4%	5	83.3%	0	

VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1, 2	NO
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation,

specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126.

OCULAR DISORDERS REPORT

VIZSLA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 3,138		2017-2021 1,410		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			0	0.0%	1	0.1%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.0%	1	0.1%	0	
21.000 ENTROPION, UNSPECIFIED			3	0.1%	1	0.1%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			26	0.8%	13	0.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	1	0.1%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.0%	1	0.1%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			4	0.1%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			7	0.2%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			42	1.3%	15	1.1%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			1	0.0%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			66	2.1%	32	2.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			12	0.4%	2	0.1%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			111	3.5%	108	7.7%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			1	0.0%	2	0.1%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			112	3.6%	38	2.7%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			20	0.6%	11	0.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			17	0.5%	9	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.1%	4	0.3%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			6	0.2%	1	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			3	0.1%	8	0.6%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			25	0.8%	16	1.1%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			17	0.5%	8	0.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			24	0.8%	15	1.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			21	0.7%	5	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.0%	1	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			4	0.1%	0	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.1%	1	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			6	0.2%	4	0.3%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			4	0.1%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			2	0.1%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			2	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			161	5.1%	84	6.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			4	0.1%	2	0.1%	0	
110.135 PHPV/ PTVL			1	0.0%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			5	0.2%	7	0.5%	0	

OCULAR DISORDERS REPORT VIZSLA

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 3,138		2017-2021 1,410		2021 0	
		#	%	#	%	#	%
VITREOUS Continued							
110.320 VITREOUS DEGENERATION SYNERESIS		12	0.4%	3	0.2%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		3	0.1%	2	0.1%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		5	0.2%	0	0.0%	0	
120.960 RETINOPATHY		3	0.1%	4	0.3%	0	
OPTIC NERVE							
130.120 OPTIC NERVE HYPOPLASIA		1	0.0%	1	0.1%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		51	1.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		74	2.4%	1	0.1%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		63	2.0%	67	4.8%	0	
NORMAL							
.000 NORMAL GLOBE		2,714	86.5%	1,116	79.1%	0	

VOLPINO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Volpino Italiano. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011; 14: 378-384.

OCULAR DISORDERS REPORT
VOLPINO ITALIANO

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE			1	100.0%	0		0	

WACHTELHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WACHTELHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT WACHTELHUND

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		2	100.0%	0		0	

WEIMARANER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - generalized	X-linked	1, 2	NO	Mutation in the <i>RPGR</i> gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

In the Weimaraner, because there is significant clinical disease associated with the abnormal hairs, breeding should be discouraged.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Kropatsch R, Akkad D, Frank M, et al. A large deletion in RPGR causes XLPRA in Weimarener dogs. *Canine Genetics and Epidemiol.* 2016; 3:7.

OCULAR DISORDERS REPORT WEIMARANER

		Year Examined: Total # Dogs:		1991-2016 1,778		2017-2021 511		2021 0	
Diagnostic Name		#	%	#	%	#	%		
EYELIDS									
21.000	ENTROPION, UNSPECIFIED	3	0.2%	0	0.0%	0			
25.110	DISTICHIASIS	519	29.2%	132	25.8%	0			
NASOLACRIMAL									
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	1	0.2%	0			
NICTITANS									
51.100	THIRD EYELID CARTILAGE ANOMALY	14	0.8%	4	0.8%	0			
CORNEA									
70.700	CORNEAL DYSTROPHY	33	1.9%	4	0.8%	0			
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.3%	1	0.2%	0			
UVEA									
93.120	IRIS CYST	4	0.2%	3	0.6%	0			
93.150	IRIS COLOBOMA	2	0.1%	0	0.0%	0			
93.170	ANTERIOR CHAMBER CYST	1	0.1%	1	0.2%	0			
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	15	0.8%	5	1.0%	0			
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.2%	0	0.0%	0			
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.3%	0	0.0%	0			
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	9	1.8%	0			
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0			
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0			
LENS									
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0			
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	103	5.8%	42	8.2%	0			
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	20	1.1%	21	4.1%	0			
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.3%	4	0.8%	0			
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	9	0.5%	7	1.4%	0			
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0			
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	2	0.4%	0			
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.7%	1	0.2%	0			
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.3%	9	1.8%	0			
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	46	2.6%	13	2.5%	0			
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	12	0.7%	6	1.2%	0			
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	21	1.2%	9	1.8%	0			
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.2%	0	0.0%	0			
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	0	0.0%	0			
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.3%	6	1.2%	0			
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	10	2.0%	0			
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.2%	1	0.2%	0			
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	1	0.2%	0			
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.1%	0	0.0%	0			
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.4%	0			
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.2%	0			
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.3%	0	0.0%	0			
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	1	0.2%	0			
100.345	SIGNIFICANT CATARACTS (SUMMARY)	161	9.1%	93	18.2%	0			
VITREOUS									
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.2%	2	0.4%	0			
110.135	PHPV/ PTVL	0	0.0%	2	0.4%	0			
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	3	0.6%	0			

OCULAR DISORDERS REPORT WEIMARANER

Diagnostic Name	Year Examined:	1991-2016		2017-2021		2021	
	Total # Dogs:	1,778		511		0	
		#	%	#	%	#	%
VITREOUS Continued							
110.320 VITREOUS DEGENERATION SYNERESIS		1	0.1%	2	0.4%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		2	0.1%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC		4	0.2%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		6	0.3%	0	0.0%	0	
120.400 RETINAL HEMORRHAGE		1	0.1%	0	0.0%	0	
120.960 RETINOPATHY		1	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		12	0.7%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		51	2.9%	3	0.6%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		28	1.6%	23	4.5%	0	
NORMAL							
.000 NORMAL GLOBE		1,135	63.8%	292	57.1%	0	

WELSH SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WELSH SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WELSH SHEEPDOG

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		1	100.0%	0		0	

WELSH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Presumed autosomal dominant	1-4	NO
B.	Entropion	Not defined	1	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
F.	Cataract	Presumed autosomal recessive	1, 5, 6	NO
G.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam. Due to the increased incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

Primary angle closure glaucoma has been reported in the Welsh Springer Spaniel. Females are affected more than males. Onset ranges from 10 weeks to 10 years. At the iridocorneal angle, the pectinate ligaments appear sparse and wispy in contrast to the sturdy fibers seen in other breeds. A dominant mode of inheritance is reported.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic),

defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Welsh Springer Spaniel, lesions may be seen as early as 8-12 weeks of age and progress rapidly to complete cataract, impairing vision. A recessive mode of inheritance is reported.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cottrell B, Barnett K. Primary glaucoma in the Welsh Springer Spaniel. *J Small Anim Pract.* 1988;29:185-199.
3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol.* 2004;7:97-111. Epub 2004/02/26.
4. Oliver JA, Ekiri A, Mellersh. Prevalence and Progression of Pectinate Ligament Dysplasia in the Welsh Springer Spaniel. *J Sm Anim Pract.* 2016;57: 416-421.
5. Barnett KC. Hereditary cataract in the Welsh Springer Spaniel. *J Small Anim Pract.* 1980;21:621-625. Epub 1980/11/01.
6. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract.* 1985;26:305.

OCULAR DISORDERS REPORT WELSH SPRINGER SPANIEL

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 2,713		2017-2021 667		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.0%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			41	1.5%	16	2.4%	0	
22.000 ECTROPION, UNSPECIFIED			3	0.1%	0	0.0%	0	
25.110 DISTICHIASIS			320	11.8%	109	16.3%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			1	0.0%	2	0.3%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			46	1.7%	19	2.8%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			2	0.1%	0	0.0%	0	
UVEA								
93.120 IRIS CYST			1	0.0%	1	0.1%	0	
93.150 IRIS COLOBOMA			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			0	0.0%	2	0.3%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			616	22.7%	185	27.7%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.1%	5	0.7%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			1	0.0%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.0%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			5	0.2%	6	0.9%	0	
95.120 CILIARY BODY CYST			1	0.0%	0	0.0%	0	
97.150 CHORIORETINAL COLOBOMA, CONGENITAL			1	0.0%	0	0.0%	0	
FUNDUS								
97.120 COLOBOMA			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			6	0.2%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			133	4.9%	33	4.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			16	0.6%	18	2.7%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			5	0.2%	4	0.6%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.0%	3	0.4%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			3	0.1%	5	0.7%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.1%	1	0.1%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			6	0.2%	5	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			4	0.1%	8	1.2%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	0.2%	2	0.3%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			2	0.1%	3	0.4%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.1%	3	0.4%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			2	0.1%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.1%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.0%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			1	0.0%	0	0.0%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			58	2.1%	54	8.1%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			10	0.4%	1	0.1%	0	
110.135 PHPV/ PTVL			1	0.0%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			5	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT WELSH SPRINGER SPANIEL

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		2,713		667		0	
			#	%	#	%	#	%
RETINA								
120.170	RETINAL DYSPLASIA, FOLDS		30	1.1%	5	0.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC		4	0.1%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		8	0.3%	1	0.1%	0	
OPTIC NERVE								
130.110	MICROPAPILLA		3	0.1%	2	0.3%	0	
130.120	OPTIC NERVE HYPOPLASIA		7	0.3%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA		4	0.1%	0	0.0%	0	
OTHER								
900.000	OTHER, UNSPECIFIED		19	0.7%	0	0.0%	0	
900.100	OTHER, NOT INHERITED		53	2.0%	1	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		27	1.0%	24	3.6%	0	
NORMAL								
.000	NORMAL GLOBE		1,789	65.9%	344	51.6%	0	

WELSH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comment

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011 Nov;14:378-384.

OCULAR DISORDERS REPORT

WELSH TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 370		2017-2021 55		2021 0	
			#	%	#	%	#	%
GLOBE								
10.000 GLAUCOMA			1	0.3%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			1	0.3%	0	0.0%	0	
25.110 DISTICHIASIS			13	3.5%	0	0.0%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			1	0.3%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			4	1.1%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.8%	1	1.8%	0	
UVEA								
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	1.8%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			30	8.1%	6	10.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			2	0.5%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			3	0.8%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			4	1.1%	11	20.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			1	0.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			22	5.9%	4	7.3%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			2	0.5%	1	1.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			2	0.5%	0	0.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.3%	1	1.8%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.8%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			2	0.5%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.3%	1	1.8%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			2	0.5%	1	1.8%	0	
100.328 Y-SUTURE TIP OPACITIES			0	0.0%	5	9.1%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			3	0.8%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			14	3.8%	9	16.4%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	1	1.8%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.3%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			6	1.6%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			13	3.5%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.3%	4	7.3%	0	
NORMAL								
.000 NORMAL GLOBE			301	81.4%	34	61.8%	0	

WEST HIGHLAND WHITE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Keratoconjunctivitis sicca	Not defined	1-4	NO
B.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1, 5 1	Breeder option Passes with no notation
C.	Cataract	Presumed autosomal recessive	1, 5	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

In the West Highland White Terrier, this disease has been reported more commonly in females than males.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the West Highland White Terrier, these membranes, when present, often bridge from the iris to the lens and may result in cataract with vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

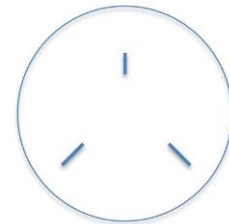
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The cataract described in the West Highland White Terrier initially involves the posterior Y sutures and may infrequently progress, resulting in vision impairment. The age of onset is less than 6 months of age. A recessive mode of inheritance is suggested by the pedigrees which have been studied.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Sansom J, Barnett KC, Neumann W, et al. Treatment of keratoconjunctivitis sicca in dogs with cyclosporine ophthalmic ointment: a European clinical field trial. *Vet Rec.* 1995; 137: 504-507.
3. Baker GJ, Formston C. An evaluation of transplantation of the parotid duct in the treatment of kerato-conjunctivitis sicca in the dog. *J Small Anim Pract.* 1968; 9: 261-268.
4. Kaswan RL, Martin CL, Chapman WL, Jr. Keratoconjunctivitis sicca: histopathologic study of nictitating membrane and lacrimal glands from 28 dogs. *Am J Vet Res.* 1984; 45: 112-118.
5. Narfstrom K. Cataract in the West Highland White Terrier. *J Small Anim Pract.* 1981; 22: 467-471.

OCULAR DISORDERS REPORT WEST HIGHLAND WHITE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,474		2017-2021 432		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			5	0.3%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			2	0.1%	4	0.9%	0	
NASOLACRIMAL								
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM			0	0.0%	2	0.5%	0	
40.910 KERATOCONJUNCTIVITIS SICCA			3	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			1	0.1%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			1	0.1%	1	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.2%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			123	8.3%	30	6.9%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			23	1.6%	1	0.2%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.3%	1	0.2%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			19	1.3%	7	1.6%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.3%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			21	1.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			117	7.9%	35	8.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			22	1.5%	11	2.5%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			12	0.8%	5	1.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			4	0.3%	3	0.7%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.1%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			28	1.9%	14	3.2%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			10	0.7%	3	0.7%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			20	1.4%	17	3.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			37	2.5%	3	0.7%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			22	1.5%	7	1.6%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			5	0.3%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.1%	0	0.0%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			5	0.3%	4	0.9%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			14	0.9%	5	1.2%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			11	0.7%	7	1.6%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.1%	3	0.7%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			2	0.1%	2	0.5%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			4	0.3%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			0	0.0%	1	0.2%	0	
100.327 INCOMPLETE CATARACT, CAPSULAR			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			20	1.4%	16	3.7%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			30	2.0%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			271	18.4%	103	23.8%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.1%	0	0.0%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			4	0.3%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			9	0.6%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			49	3.3%	12	2.8%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			3	0.2%	0	0.0%	0	

OCULAR DISORDERS REPORT WEST HIGHLAND WHITE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016 1,474		2017-2021 432		2021 0	
		#	%	#	%	#	%
RETINA Continued							
120.190 RETINAL DYSPLASIA, DETACHED		1	0.1%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)		15	1.0%	1	0.2%	0	
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS		1	0.1%	0	0.0%	0	
120.920 RETINAL DETACHMENT WITH DIALYSIS		2	0.1%	0	0.0%	0	
120.960 RETINOPATHY		1	0.1%	1	0.2%	0	
OPTIC NERVE							
130.150 OPTIC DISC COLOBOMA		2	0.1%	0	0.0%	0	
OTHER							
900.000 OTHER, UNSPECIFIED		33	2.2%	0	0.0%	0	
900.100 OTHER, NOT INHERITED		17	1.2%	1	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		33	2.2%	18	4.2%	0	
NORMAL							
.000 NORMAL GLOBE		1,069	72.5%	300	69.4%	0	

WHIPPET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Vitreous degeneration - syneresis	Not defined	1, 2	Breeder option	
D.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3	NO	Mutation in the <i>NHEJ1</i> gene
E.	Retinal atrophy – generalized	Not defined	4	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment. This is a significant problem in the Whippet.

D. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly" and has been identified in the longhaired Whippet. The choroidal hypoplasia component is caused by a 7799 base pairs deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Krishnan, H., et al. (2020). "Vitreous degeneration and associated ocular abnormalities in the dog." *Vet Ophthalmol* **23**(2): 219-224. PMID: 31464365
3. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome research*. 2007;17:1562-1571. Epub 2007/10/06.
4. Somma A, Moreno J, Sato M, et al. Characterization of a novel form of Progressive Retinal Atrophy in Whippet dogs: a clinical, electroretinographic, and breeding study. *Vet Ophth*. 2016: 1-10.

OCULAR DISORDERS REPORT WHIPPET

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 11,506		2017-2021 2,997		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.0%	0	0.0%	0	
EYELIDS								
20.140 ECTOPIC CILIA			2	0.0%	0	0.0%	0	
22.000 ECTROPION, UNSPECIFIED			1	0.0%	0	0.0%	0	
25.110 DISTICHIASIS			9	0.1%	4	0.1%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			0	0.0%	1	0.0%	0	
NICTITANS								
50.210 PLASMOMA/ ATYPICAL PANNUS			1	0.0%	0	0.0%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.0%	0	0.0%	0	
CORNEA								
70.210 PANNUS			5	0.0%	1	0.0%	0	
70.700 CORNEAL DYSTROPHY			38	0.3%	10	0.3%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			6	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			0	0.0%	2	0.1%	0	
93.120 IRIS CYST			15	0.1%	6	0.2%	0	
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM			1	0.0%	0	0.0%	0	
93.170 ANTERIOR CHAMBER CYST			2	0.0%	3	0.1%	0	
93.180 IRIS SPHINCTER DYSPLASIA			2	0.0%	0	0.0%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			103	0.9%	54	1.8%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			10	0.1%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			11	0.1%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			16	0.1%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			9	0.1%	6	0.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			4	0.0%	4	0.1%	0	
93.810 UVEAL MELANOMA			0	0.0%	1	0.0%	0	
95.120 CILIARY BODY CYST			1	0.0%	4	0.1%	0	
FUNDUS								
97.110 CHOROIDAL HYPOPLASIA			19	0.2%	0	0.0%	0	
97.120 COLOBOMA			4	0.0%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			11	0.1%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			428	3.7%	118	3.9%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			76	0.7%	43	1.4%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			26	0.2%	9	0.3%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			44	0.4%	16	0.5%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			11	0.1%	4	0.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			16	0.1%	18	0.6%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			27	0.2%	15	0.5%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			19	0.2%	15	0.5%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			63	0.5%	24	0.8%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			41	0.4%	3	0.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			57	0.5%	17	0.6%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			2	0.0%	2	0.1%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			12	0.1%	1	0.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			17	0.1%	3	0.1%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			21	0.2%	1	0.0%	0	

OCULAR DISORDERS REPORT WHIPPET

Year Examined: Total # Dogs:		1991-2016 11,506		2017-2021 2,997		2021 0	
Diagnostic Name		#	%	#	%	#	%
LENS Continued							
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.0%	5	0.2%	0	
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	4	0.1%	0	
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	2	0.1%	0	
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.1%	0	
100.328	Y-SUTURE TIP OPACITIES	13	0.1%	22	0.7%	0	
100.330	GENERALIZED/ COMPLETE CATARACT	16	0.1%	2	0.1%	0	
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	33	0.3%	2	0.1%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	479	4.2%	208	6.9%	0	
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	16	0.1%	20	0.7%	0	
110.135	PHPV/ PTVL	12	0.1%	0	0.0%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	110	1.0%	47	1.6%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	527	4.6%	68	2.3%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	32	0.3%	9	0.3%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.0%	6	0.2%	0	
120.190	RETINAL DYSPLASIA, DETACHED	4	0.0%	1	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	41	0.4%	10	0.3%	0	
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	
120.960	RETINOPATHY	8	0.1%	4	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.0%	1	0.0%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	14	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	114	1.0%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	233	2.0%	2	0.1%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	139	1.2%	143	4.8%	0	
NORMAL							
.000	NORMAL GLOBE	10,149	88.2%	2,523	84.2%	0	

WHITE SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Mi-Ki, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the White Shepherd breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT WHITE SHEPHERD

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		30		40		0	
		#	%	#	%	#	%
CORNEA							
70.210 PANNUS		0	0.0%	2	5.0%	0	
70.700 CORNEAL DYSTROPHY		2	6.7%	4	10.0%	0	
UVEA							
93.170 ANTERIOR CHAMBER CYST		0	0.0%	1	2.5%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS		1	3.3%	0	0.0%	0	
LENS							
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		1	3.3%	3	7.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX		0	0.0%	1	2.5%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES		1	3.3%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS		1	3.3%	1	2.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR		1	3.3%	0	0.0%	0	
100.328 Y-SUTURE TIP OPACITIES		1	3.3%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)		4	13.3%	2	5.0%	0	
RETINA							
120.170 RETINAL DYSPLASIA, FOLDS		1	3.3%	0	0.0%	0	
OPTIC NERVE							
130.110 MICROPAPILLA		1	3.3%	2	5.0%	0	
130.120 OPTIC NERVE HYPOPLASIA		1	3.3%	0	0.0%	0	
OTHER							
900.100 OTHER, NOT INHERITED		0	0.0%	1	2.5%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN		3	10.0%	2	5.0%	0	
NORMAL							
.000 NORMAL GLOBE		20	66.7%	27	67.5%	0	

WHITE SWISS SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WHITE SWISS SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT WHITE SWISS SHEPHERD

Diagnostic Name	Year Examined:		1991-2016		2017-2021		2021	
	Total # Dogs:		#	%	#	%	#	%
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	4	16.0%	0	
UVEA								
93.170 ANTERIOR CHAMBER CYST			0	0.0%	1	4.0%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	8.3%	3	12.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			1	8.3%	2	8.0%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	8.3%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			0	0.0%	1	4.0%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			0	0.0%	1	4.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			2	16.7%	4	16.0%	0	
NORMAL								
.000 NORMAL GLOBE			11	91.7%	16	64.0%	0	

WINDSPRITE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WINDSPRITE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT WINDSPRITE

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
VITREOUS 110.320 VITREOUS DEGENERATION SYNERESIS		0	0.0%	1	1.6%	0	
NORMAL .000 NORMAL GLOBE		4	100.0%	62	98.4%	0	

WIRE FOX TERRIER*

*The Wire Fox Terrier and the Smooth Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1, 2	NO	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	3	NO	Mutation in the <i>ADAMTS17</i> gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The cataracts observed in Wire Fox Terrier begin in the posterior subcapsular region and are progressive.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Martin CL, Wyman M. Primary glaucoma in the dog. *Vet Clin North Am.* 1978;8:257-286.
3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384.

OCULAR DISORDERS REPORT WIRE FOX TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 316		2017-2021 28		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			1	0.3%	0	0.0%	0	
EYELIDS								
25.110 DISTICHIASIS			8	2.5%	1	3.6%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			3	0.9%	0	0.0%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.3%	0	0.0%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			107	33.9%	11	39.3%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			5	1.6%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	1.6%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS			1	0.3%	0	0.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			0	0.0%	1	3.6%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			4	1.3%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			2	0.6%	0	0.0%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			3	0.9%	0	0.0%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.3%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			5	1.6%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			5	1.6%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			2	0.6%	0	0.0%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			1	0.3%	0	0.0%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			1	0.3%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			1	0.3%	0	0.0%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.3%	0	0.0%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			8	2.5%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			32	10.1%	0	0.0%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			1	0.3%	0	0.0%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.3%	0	0.0%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			1	0.3%	0	0.0%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)			4	1.3%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			3	0.9%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			12	3.8%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			1	0.3%	0	0.0%	0	
NORMAL								
.000 NORMAL GLOBE			183	57.9%	16	57.1%	0	

WIREHAired POINTING GRIFFON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

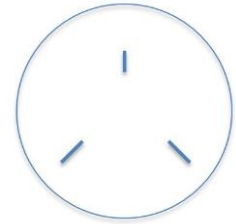
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: “punctate posterior sutures” AND ALSO MARK “suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT WIREHAIRD POINTING GRIFFON

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 533		2017-2021 423		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPTHALMIA			1	0.2%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			3	0.6%	2	0.5%	0	
25.110 DISTICHIASIS			5	0.9%	6	1.4%	0	
NICTITANS								
51.100 THIRD EYELID CARTILAGE ANOMALY			0	0.0%	1	0.2%	0	
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.2%	0	0.0%	0	
CORNEA								
70.210 PANNUS			0	0.0%	1	0.2%	0	
70.700 CORNEAL DYSTROPHY			1	0.2%	1	0.2%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			3	0.6%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.2%	1	0.2%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			8	1.5%	7	1.7%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			1	0.2%	5	1.2%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			43	8.1%	26	6.1%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			12	2.3%	9	2.1%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			3	0.6%	2	0.5%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.2%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			1	0.2%	1	0.2%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	0.4%	4	0.9%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			9	1.7%	6	1.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			2	0.4%	4	0.9%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			3	0.6%	1	0.2%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			5	0.9%	0	0.0%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			1	0.2%	2	0.5%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			5	0.9%	3	0.7%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	1	0.2%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			0	0.0%	1	0.2%	0	
100.328 Y-SUTURE TIP OPACITIES			2	0.4%	8	1.9%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			45	8.4%	43	10.2%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			0	0.0%	7	1.7%	0	
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			2	0.4%	2	0.5%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			5	0.9%	1	0.2%	0	
RETINA								
120.170 RETINAL DYSPLASIA, FOLDS			5	0.9%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC			1	0.2%	0	0.0%	0	
120.400 RETINAL HEMORRHAGE			1	0.2%	0	0.0%	0	
120.960 RETINOPATHY			0	0.0%	1	0.2%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			6	1.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			2	0.4%	1	0.2%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			11	2.1%	16	3.8%	0	
NORMAL								
.000 NORMAL GLOBE			457	85.7%	346	81.8%	0	

WIREHAired VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT WIREHAired VIZSLA

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 129		2017-2021 125		2021 0	
			#	%	#	%	#	%
EYELIDS								
25.110 DISTICHIASIS			0	0.0%	1	0.8%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			3	2.3%	0	0.0%	0	
CORNEA								
70.700 CORNEAL DYSTROPHY			0	0.0%	1	0.8%	0	
UVEA								
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			10	7.8%	5	4.0%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			11	8.5%	7	5.6%	0	
LENS								
100.210 CATARACT, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			19	14.7%	9	7.2%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			6	4.7%	0	0.0%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			1	0.8%	0	0.0%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			1	0.8%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			2	1.6%	0	0.0%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			1	0.8%	3	2.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			7	5.4%	2	1.6%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			0	0.0%	2	1.6%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.8%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			1	0.8%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			0	0.0%	2	1.6%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	1	0.8%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.8%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			20	15.5%	11	8.8%	0	
VITREOUS								
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER			1	0.8%	1	0.8%	0	
110.320 VITREOUS DEGENERATION SYNERESIS			1	0.8%	0	0.0%	0	
RETINA								
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS			1	0.8%	0	0.0%	0	
OTHER								
900.000 OTHER, UNSPECIFIED			4	3.1%	0	0.0%	0	
900.100 OTHER, NOT INHERITED			0	0.0%	1	0.8%	0	
900.110 OTHER, SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			3	2.3%	8	6.4%	0	
NORMAL								
.000 NORMAL GLOBE			99	76.7%	94	75.2%	0	

WORKING KELPIE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WORKING KELPIE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WORKING KELPIE

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		#	%	#	%	#	%
NORMAL .000 NORMAL GLOBE		0		2	100.0%	0	

XOLOITZCUINTLI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (<i>prcd</i>)	Autosomal recessive	2, 3	NO	Mutation in the <i>prcd</i> gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstiä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650
3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT XOLOITZCUINTLI

Year Examined: Total # Dogs:		1991-2016 71		2017-2021 141		2021 0	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	1.4%	1	0.7%	0	
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	4.2%	1	0.7%	0	
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	1.4%	3	2.1%	0	
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	7	5.0%	0	
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	3	2.1%	0	
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.7%	0	
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	4	2.8%	0	
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	2.8%	1	0.7%	0	
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	8.5%	2	1.4%	0	
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	2.8%	1	0.7%	0	
100.317	INCIPIENT CATARACT, CAPSULAR	3	4.2%	0	0.0%	0	
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	1.4%	0	
100.345	SIGNIFICANT CATARACTS (SUMMARY)	13	18.3%	14	9.9%	0	
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	2	1.4%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	1	0.7%	0	
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	1.4%	0	0.0%	0	
OTHER							
900.100	OTHER, NOT INHERITED	1	1.4%	0	0.0%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	2.8%	0	
NORMAL							
.000	NORMAL GLOBE	59	83.1%	120	85.1%	0	

YAKUTIAN LAIKA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the YAKUTIAN LAIKA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT YAKUTIAN LAIKA

Diagnostic Name	Year Examined: Total # Dogs:	1991-2016		2017-2021		2021	
		2		24		0	
		#	%	#	%	#	%
UVEA							
93.120	IRIS CYST	1	50.0%	0	0.0%	0	
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	50.0%	0	0.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	50.0%	0	0.0%	0	
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	4.2%	0	
NORMAL							
.000	NORMAL GLOBE	1	50.0%	23	95.8%	0	

YORKSHIRE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	3-5	NO	Mutation in the <i>ADAMTS17</i> gene
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy - generalized	Not defined	1	NO	

Description and Comment

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment. There is evidence that Yorkshire Terriers sometimes present with severe, congenital, unilateral keratoconjunctivitis sicca (KCS) and it is suspected this is due to hypoplasia or aplasia of the gland.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.
2. Herrera HD, Weichsler N, Gomez JR, et al. Severe, unilateral, unresponsive keratoconjunctivitis sicca in 16 juvenile Yorkshire Terriers. *Vet Ophthalmol.* 2007;10:285-288.
3. Gould D, Pettitt L, McLaughlin B, et al. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384.

4. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.
5. Walde I. Retinal and corneal dysplasias in the Yorkshire Terrier and other breeds in Austria. *Tiereztliche Praxis*. 1997;25:62.

OCULAR DISORDERS REPORT YORKSHIRE TERRIER

Diagnostic Name	Year Examined: Total # Dogs:		1991-2016 1,681		2017-2021 823		2021 0	
			#	%	#	%	#	%
GLOBE								
.110 MICROPHthalmia			4	0.2%	2	0.2%	0	
10.000 GLAUCOMA			1	0.1%	0	0.0%	0	
EYELIDS								
21.000 ENTROPION, UNSPECIFIED			0	0.0%	1	0.1%	0	
25.110 DISTICHIASIS			34	2.0%	6	0.7%	0	
NASOLACRIMAL								
40.910 KERATOCONJUNCTIVITIS SICCA			6	0.4%	1	0.1%	0	
NICTITANS								
52.110 PROLAPSED GLAND OF THE THIRD EYELID			1	0.1%	0	0.0%	0	
CORNEA								
70.210 PANNUS			4	0.2%	0	0.0%	0	
70.220 PIGMENTARY KERATITIS			4	0.2%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY			13	0.8%	4	0.5%	0	
70.730 CORNEAL ENDOTHELIAL DEGENERATION			1	0.1%	0	0.0%	0	
UVEA								
93.110 IRIS HYPOPLASIA			1	0.1%	1	0.1%	0	
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS			159	9.5%	59	7.2%	0	
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS			4	0.2%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA			5	0.3%	1	0.1%	0	
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS			13	0.8%	18	2.2%	0	
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS			2	0.1%	0	0.0%	0	
LENS								
100.200 CATARACT, UNSPECIFIED			23	1.4%	0	0.0%	0	
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN			53	3.2%	12	1.5%	0	
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX			35	2.1%	15	1.8%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX			13	0.8%	1	0.1%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX			6	0.4%	1	0.1%	0	
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES			5	0.3%	0	0.0%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES			5	0.3%	4	0.5%	0	
100.306 PUNCTATE CATARACT, NUCLEUS			2	0.1%	3	0.4%	0	
100.307 PUNCTATE CATARACT, CAPSULAR			1	0.1%	5	0.6%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX			28	1.7%	20	2.4%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX			17	1.0%	17	2.1%	0	
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX			17	1.0%	3	0.4%	0	
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES			3	0.2%	19	2.3%	0	
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES			3	0.2%	21	2.6%	0	
100.316 INCIPIENT CATARACT, NUCLEUS			3	0.2%	12	1.5%	0	
100.317 INCIPIENT CATARACT, CAPSULAR			1	0.1%	1	0.1%	0	
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX			2	0.1%	8	1.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX			0	0.0%	5	0.6%	0	
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX			0	0.0%	1	0.1%	0	
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES			0	0.0%	1	0.1%	0	
100.326 INCOMPLETE CATARACT, NUCLEUS			1	0.1%	1	0.1%	0	
100.328 Y-SUTURE TIP OPACITIES			1	0.1%	2	0.2%	0	
100.330 GENERALIZED/ COMPLETE CATARACT			28	1.7%	1	0.1%	0	
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED			1	0.1%	0	0.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)			194	11.5%	142	17.3%	0	
VITREOUS								
110.120 PERSISTENT HYALOID ARTERY/ REMNANT			2	0.1%	3	0.4%	0	

OCULAR DISORDERS REPORT YORKSHIRE TERRIER

Year Examined: Total # Dogs:		1991-2016 1,681		2017-2021 823		2021 0	
Diagnostic Name		#	%	#	%	#	%
VITREOUS Continued							
110.135	PHPV/ PTVL	4	0.2%	1	0.1%	0	
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.4%	7	0.9%	0	
110.320	VITREOUS DEGENERATION SYNERESIS	16	1.0%	8	1.0%	0	
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.5%	0	0.0%	0	
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	54	3.2%	4	0.5%	0	
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	3	0.4%	0	
120.960	RETINOPATHY	4	0.2%	1	0.1%	0	
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.1%	0	
130.120	OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%	0	
130.150	OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	
OTHER							
900.000	OTHER, UNSPECIFIED	19	1.1%	0	0.0%	0	
900.100	OTHER, NOT INHERITED	26	1.5%	2	0.2%	0	
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.5%	31	3.8%	0	
NORMAL							
.000	NORMAL GLOBE	1,277	76.0%	616	74.8%	0	