## ENGLISH COCKER SPANIEL

<table>
<thead>
<tr>
<th>DISORDER</th>
<th>INHERITANCE</th>
<th>REFERENCE</th>
<th>BREEDING ADVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Keratoconjunctivitis Sicca (dry eye)</td>
<td>Not defined</td>
<td>13</td>
<td>Breeder option</td>
</tr>
<tr>
<td>B. Distichiasis</td>
<td>Not defined</td>
<td>1</td>
<td>Breeder option</td>
</tr>
<tr>
<td>C. Ectropion</td>
<td>Not defined</td>
<td>1</td>
<td>Breeder option</td>
</tr>
<tr>
<td>D. Imperforate lacrimal punctum</td>
<td>Not defined</td>
<td>1</td>
<td>Breeder option</td>
</tr>
<tr>
<td>E. Corneal dystrophy</td>
<td>Not defined</td>
<td>11</td>
<td>Breeder option</td>
</tr>
<tr>
<td>F. Persistent pupillary membranes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- iris to iris</td>
<td>Not defined</td>
<td>1, 11</td>
<td>Breeder option</td>
</tr>
<tr>
<td>- iris to cornea</td>
<td>Not defined</td>
<td>15</td>
<td>NO</td>
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<tr>
<td>- all other forms</td>
<td>Not defined</td>
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<tr>
<td>G. Glaucoma</td>
<td>Not defined</td>
<td>1-3</td>
<td>NO</td>
</tr>
<tr>
<td>H. Cataract</td>
<td>Not defined</td>
<td>1, 4-5, 16</td>
<td>NO</td>
</tr>
<tr>
<td>I. Retinal dysplasia</td>
<td>Presumed autosomal recessive</td>
<td>1-3, 12</td>
<td>Breeder option</td>
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<tr>
<td>- folds</td>
<td>Presumed autosomal recessive</td>
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<tr>
<td>J. Retinal atrophy</td>
<td>Autosomal recessive</td>
<td>1, 6-9, 14</td>
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</tr>
<tr>
<td>- generalized (prcd)</td>
<td>Autosomal recessive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Central progressive retinal atrophy</td>
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<td>10</td>
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Description and Comments

A. Keratoconjunctivitis sicca (KCS) / dry eye

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. 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. 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.

D. Imperforate lacrimal punctum

A developmental abnormality 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 these dogs, 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.

F. Persistent pupillary membranes (PPM)

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.

In the English Cocker Spaniel, this is a particularly serious problem as the majority of ppm’s identified on routine screening examination bridge from the iris to the cornea and are

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associated with corneal opacities which may result in vision impairment.

G. 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.

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.

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.

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. 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.

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. Early fundus abnormalities usually appear after 4 years of age. The ERG (electroretinogram) shows marked functional abnormalities indicative of a progressive rod-cone degeneration after 18 months of age.

Studies have shown that PRA in the English cocker spaniel is inherited as autosomal recessive. The mutation is allelic to that present in miniature poodles, Portuguese water dog, Labrador retriever and American cocker spaniels. The locus is termed the progressive rod-cone degeneration (prcd) gene. A marker-based linkage test is now available for early diagnosis. The test identifies genetically normal dogs (Type A) with 100% accuracy. The carrier state (Type B) will not be affected but may produce PRA bred to an affected dog. The affected (Type C) is at risk for developing PRA. ERG testing is recommended to confirm this. In both type B and type C, false allele readings may lead to misdiagnosis. Current efforts are under research to eliminate these false readings.

For DNA testing contact Optigen®: prcd-PRA test. Optigen LLC, Cornell Business and Technology Park, 33 Thornwood Dr., Suite 102, Ithaca, NY 14850. Telephone: 607-257-0301. E-mail: genetest@optigen.com; website: www.optigen.com.

K. 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.
References

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12. ACVO Genetics Committee, 2006 and/or Data from CERF All Breeds Report, 2001-2005.
15. ACVO Genetics Committee, 2009 and/or Data from CERF All-Breeds Report, 2008.

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