The Price of a Pedigree

DOG BREED STANDARDS AND BREED-RELATED ILLNESS

ADVOCATES FOR ANIMALS
Giving voice, taking action

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Dog breed standards and breed-related illness

A report by Advocates for Animals
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1. Introduction:
The welfare implications of pedigree dog breed standards

'BREEDERS AND SCIENTISTS HAVE LONG BEEN AWARE THAT ALL IS NOT WELL IN THE WORLD OF COMPANION ANIMAL BREEDING.' **Animal Welfare, vol 8, 1999** [1]

There were an estimated 6.5 million dogs in the UK in 2003 and one in five of all households includes a dog.[2] Only a minority (around a quarter) of these dogs are mongrels or mixed breed dogs. The majority are pedigree dogs from one of the estimated 400 dog breeds that have been created by humans to date, all of them believed by scientists to originate from the grey wolf (Canis lupus).[3] Modern dog breeds include extremes of size and shape very far removed from the wolf ancestor. Breeds were originally created by selective breeding to be suitable for specific tasks, such as herding, guarding and hunting. Today, dogs are increasingly being bred for their looks and are required to conform to an ideal 'breed standard' of appearance; the Kennel Club (UK) currently recognises and publishes breed standards for 203 breeds.

Grey Wolf © Colin Seddon

Many members of the public are led to believe that when they buy a pedigree puppy they are buying the highest quality and healthiest dog. But this is often far from true. Veterinarians have been aware for decades that pedigree dogs are bred for their appearance rather than for their good health. Breed-related diseases are often very prevalent in pedigrees and these amount to a huge burden of disability and suffering for the dogs and a considerable source of worry and expense for dog owners. Pedigree dogs can often turn out to be hard to care for and expensive in veterinary bills. Many end up in rescue sanctuaries. Animal welfare societies such as the RSPCA may find themselves helping to pay for the veterinary care of pedigree dogs that have been bred to be predisposed to illness.

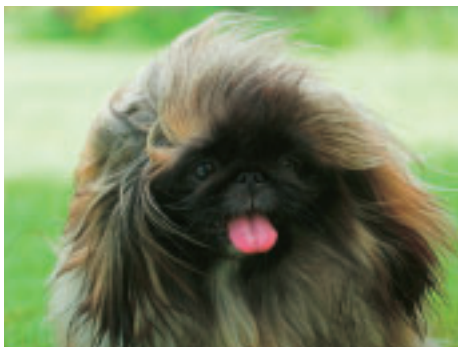
This report gives an overview of the scientific evidence showing that pedigree dog breeding puts pedigree dogs at increased risk of ill-health and thus reduces their welfare. In view of these facts, current pedigree dog breeding policies and practices cannot be seen as ethical or acceptable in their present form. Members of the public who buy pedigree dogs or attend pedigree dog shows are, unintentionally, supporting an inappropriate breeding system that cannot be justified on animal welfare grounds.

'Breed standards' often include exaggerated and unnatural physical characteristics that are detrimental to the dogs' health and quality of life. Dogs whose backs are too long in proportion to their legs, such as Dachshunds, are more likely to suffer from spine problems. Dogs whose faces are too flat and puckered, such as the Pekinese, the Pug or Bulldog, are more likely to have problems with breathing. Dogs with excessively loose skin forming folds on their face or body, are more likely to suffer from itching or painful skin complaints or sore and irritated eyes. Dogs bred to be abnormally large and fast-growing or abnormally tiny and frail have corresponding problems, for example with their hearts and bones. The inbreeding of dogs to achieve greater uniformity in appearance and greater conformity to the breed look has led to many disorders being inherited within breeds. Hip and elbow problems that can lead to painful and disabling arthritis are inherited in many of the larger dog breeds. A large number of eye diseases, some painful or leading to partial or total blindness, are inherited in many breeds both large and small. Many dog breeds either inherit, or are predisposed to, a number of heart conditions. Given that mongrel dogs with a thoroughly mixed ancestry are in general more likely than pedigrees to be healthy and adaptable, it is clear that pedigree dog breeding practices are in urgent need of reform.

Dachshund. © Colin Seddon

Shar Pei © Colin Seddon

Doberman © Colin Seddon



Pekinese. © Colin Seddon

Pug © Colin Seddon

German Shepherd Dog © Colin Seddon

Rottweiler © Colin Seddon

British Bulldog © Colin Seddon

Golden Retriever © Colin Seddon

Many dog breeds have also been bred to be strongly motivated to carry out certain specific behaviours, such as chasing, hunting, herding, guarding and fighting. When such dogs are living as companion animals, their strong motivation may make it hard for them to adapt to life in a modern home and can lead to frustration. This also causes problems for the owner who may not have been aware of the dog's breed-related instinctive behaviour.

The health problems of pedigrees are so well known to scientists and veterinarians (see below) that voluntary testing schemes have been set up by the Kennel Club and the British Veterinary Association (BVA), and by some breed societies, to allow breeders and owners to screen dogs for some of the disorders that are known to affect their breed. The aim is gradually to improve the breed's health by allowing breeders to screen their dogs and thus avoid breeding from dogs that have heritable health problems. However, the Kennel Club has not made health screening and scoring of dogs compulsory for its members, which means that some breeders and dog owners do not use this option. In 2004 the Kennel Club opened a voluntary 'Accredited Breeder Scheme' which does include mandatory health screening for 68 specified breeds, for one or more of the following; eyes, hips, elbows and specific DNA tests where those are available. Advocates for Animals believes that dog breed societies, and the Kennel Club UK, should make appropriate health screening a condition for the registration of all dogs and that the primary aim of selection of dogs for breeding should be the positive functional health of the puppies. The public should be able to expect that all pedigree puppies are registered with the Kennel Club and that the puppies' parents have had appropriate health screening.

In the case of some breeds, it is necessary to reverse the selective breeding for exaggerated and inappropriate physical characteristics required by the breed standard. Advocates for Animals believes that breed standards need to be reformed in order to remove inappropriate physical characteristics from the conformation of some breeds, taking into consideration the guidelines suggested by the *1995 Resolution of the Multilateral Consultation on the European Convention for the Protection of Pet Animals*. This could involve the severe modification of certain extreme breeds in their present form.

Designer dogs: scientific and veterinary views

- In late 2005, the first genome sequence of a domestic dog (a female boxer) was published in the scientific journal *Nature*. Commenting on the applications of the dog genome to human health research, the authors state:

  '*As a consequence of these stringent breeding programmes and periodic population bottlenecks (for example, during the World Wars), many of the ~400 modern dog breeds also show a high prevalence of specific diseases, including cancers, blindness, heart disease, cataracts, epilepsy, hip dysplasia and deafness.*'[3]

- In 2005, Finnish and Dutch animal scientists, writing in the journal Animal Welfare, commented:

  '*The dogs that most closely meet the rigorous standards regulating their external characteristics, as demonstrated by their success at breed shows, are most in demand for use in breeding. Even unhealthy, exaggerated conformations are desired in the standards of some breeds. Together with the use of inbreeding as a common mating system, this has led to a growing number of breed-specific hereditary problems*.'[4]

- In 1999, animal scientists at the University of Sydney commented:

  '*Some breed standards and selection practices run counter to the welfare interests of dogs, to the extent that some breeds are characterized by traits that may be difficult to defend on welfare grounds. Meanwhile, little selection pressure seems to be exerted on some traits that would improve animal welfare and produce dogs better suited to modern society. Unfortunately, the incidence of certain inherited defects in some breeds is unacceptably high, while the number of registered animals of certain breeds within some countries is so low as to make it almost impossible for breeders to avoid mating close relatives*'.[1]

- In the late 1990s, a Royal Veterinary College expert in ophthalmology wrote in a forum on genetics and animal welfare:

  '*Within the world of the pedigree dog, competition is extreme – and breeding policy based on dedication to breed type has resulted in the appearance of some 300 inherited diseases among canine species worldwide...[I]n essence these are man-made diseases, and, as such, largely preventable. Inbreeding to enhance desired appearance or performance can mean that the effective gene pool is restricted and the control of inherited diseases can be difficult*.'[5]

2. Current and future breeding trends

Breed standards are a cause for concern both in the present and for the future. In the present, the standards can damage the welfare of dogs. For the future, there must be concern that further extreme breeds may be created as 'designer dogs', or that increasing numbers of breeders and owners turn to artificial breeding technologies such as artificial insemination or even cloning.

Some breed standards today call for traits that can be considered to be close to physical abnormalities and are known to adversely affect health or behaviour. Examples of such breed standards include: 'very large, globular eyes' (the Pug), a 'large skull' (the Bulldog), 'loose skin' and 'a frowning expression' (the Chinese Shar Pei), a curtain of long hair 'overshadowing the eyes' (the Hungarian Puli), a very short head and nose (the Pekinese, brachycephalic breeds), very fine legs (the Miniature Poodle), a long back (the Dachshund, chondrodystrophoid breeds).[1, 6] Similar problems also apply to cats bred to meet an extreme breed standard, such as Persians or Siamese.

The official breed standards show that the Kennel Club is well aware of the physical problems their standards can cause for some dogs in the breed.[1] While requiring a 'flat' profile for the Pekinese, the judges should consider 'any signs of respiratory distress' or 'pinched nostrils' to be unacceptable. For the Dachshund, while the back must be 'long' and the legs 'short', the dog must have its '*body sufficiently clear of ground to allow free movement*.' For the Bulldog, the gait should be '*peculiarly heavy and constrained*' but '*soundness of movement*' is '*of utmost importance*.' The bulldog's head must be large in proportion to its body, but not so much as to '*make the dog appear deformed, or interfere with its powers of motion*', while '*dogs showing respiratory distress [are] highly undesirable*.' [6] In these and other cases, what is being demanded of the top show dogs is, at best, highly contradictory. The standards require physical features that are likely to cause physical problems, such as Pekinese that have difficulty breathing, Dachshunds whose bellies hardly clear the ground, Bulldogs that have problems with movement or breathing. On the other hand, the show dogs themselves must be free of these very problems.

The pursuit of stringent breed standards has also encouraged inbreeding, the selection of parent dogs who share a common ancestor (such as half-siblings or cousins, aunt and nephew – or even full siblings or parent and offspring, although this should be rare). Inbreeding (sometimes referred to as 'line breeding') may be practised deliberately, for example when particular sires or families are widely used for breeding, even in breeds that contain a large number of individual animals, thus decreasing the breed's genetic diversity. In addition, inbreeding may be practised because there are insufficient numbers of new animals coming on to the pedigree register, in the case of numerically small breeds.[1, 7]

There is a danger that current trends will only intensify as dogs are increasingly seen as fashion accessories and new breeds are created to meet the demand for a novel and 'perfect' dog. The 'toy' Chinese crested breed, believed to have originated from Africa, is hairless over most of the body, allowing the owner to dress the animals in designer clothes for cold weather; this breed is already recognised by the Kennel Club. The Puggle is a cross between a Pug and a Beagle (both of these are breeds that have serious health problems). A Labradoodle is a cross between a Labrador Retriever and a Poodle, originally intended to reduce people's allergic reactions to the hair of Labrador Retrievers. Several other new crosses are reported to be growing in popularity, particularly those that are seen as suitable for modern urban living.[8] It is to be feared that these new breeds will inherit or develop the health problems of their parent breeds and be subject to similarly inappropriate breed standards. 'Teacup Dogs', even smaller versions of existing 'toy' breeds such as the Chihuahua or Yorkshire Terrier, are being bred from runt parents for the celebrity fashion market. According to veterinarians, these dogs are too small for their teeth, stomachs or bones to grow and function properly.[9] Unethical and irresponsible trends such as these emphasise the need for reform and regulation in the pedigree dog breeding business. Artificial insemination is not allowed by the Kennel Club UK without prior permission but there is concern that some commercial breeders use it, sometimes by taking their female dogs outside the UK for the procedure to be carried out.

Chinese Crested Dog © Colin Seddon

Dog cloning

There is at least one commercial company in the US offering to clone cats and dogs (the first reported commercial sale of a cloned cat was in 2004). However, the odds are strongly against a cloned puppy being born alive and healthy and the technique involves the use and wastage of a large number of other dogs in the process. In 2005, the first cloned puppy, an Afghan Hound, was born in a Korean research laboratory, cloned from an adult male Afghan Hound. He was the only surviving puppy born from a total of 123 female dogs implanted with cloned embryos. Only one other puppy was born from this experiment, and the second one died from breathing difficulty and pneumonia after 3 weeks,[10] an outcome that is quite common for cloned newborn animals. In 2004, cloned wildcat kittens were born from embryos implanted into 51 domestic cats. Of 17 kittens born, 7 were stillborn and 8 died almost immediately or within 6 weeks of birth, leaving only 2 surviving kittens.[11] It is well known that cloned offspring are very likely to have placental defects and that their lungs, hearts and immune systems often fail to develop properly. A cloning expert at the Roslin Institute wrote, in 2003, that '*The present procedures…are very inefficient when typically between 1% and 4% of reconstructed embryos develop to adulthood….This outcome is assumed to reflect the inappropriate expression of a large number of genes whose lethal effect is exerted at different stages*.' [12]

The Church of Scotland's Science, Religion and Technology Project has explained why 'pet cloning' in unethical as follows: '*[C]loning of animals that normally reproduce sexually is a wholly artificial act with no correspondence in nature. In the light of the intrinsic value of all animals, regardless of whether suffering and welfare problems were overcome, we have argued that animal cloning would not normally be justified, except in special circumstances where it enabled something of great moral value that could be achieved in no other way….[C]loning a pet ranks as an essentially cosmetic application which is not morally justified*.' [13]

3. The prevalence of breed-related disease and abnormality

In many cases there are, perhaps surprisingly, no overall statistics on the prevalence rates of breed-related disease. This may be because there has been little centrally organised collection of health data up to now, and it may also reflect an unwillingness on the part of breeders to be open about the health problems of their dogs. However, some statistics have been and are being collected in the UK for a number of diseases that are known to be inherited and breed-related, particularly from the Kennel Club and BVA health screening schemes. In addition, the Kennel Club, the British Small Animal Veterinary Association and the Animal Health Trust in 2004 initiated a questionnaire health survey covering all the main areas of dog health, for which the data is still being collected from the members of the largest dog breed societies (70,000 questionnaires were sent out). Provided that a sufficient and representative number of pedigree dog owners have responded, this survey should give additional information about disease prevalence.

In spite of these initiatives, members of the public who are considering buying a pedigree dog may find little statistical information on the health of different breeds. This may mean that pedigree dogs are often bought in ignorance of the health status of the breed. It would clearly be desirable for statistical data on the prevalence of disease in different breeds to be made more accessible to the public.

The following sections of this report bring together a number of experts' assessments of the extent of breed-related health conditions that affect pedigree dogs. The topics covered are hip and elbow dysplasia, eye disease, heart and respiratory disease, skin disease, leg and back disease, bone cancer and deafness.

The cost of a pedigree

According to data collected by Churchill Insurance in the UK up to January 2006, the veterinary and other treatment costs for a purebred dog are likely to be considerably more than for a mongrel. A dog of the most costly breed listed by Churchill Insurance, the Great Dane, is likely to need over 4 times as much as a mongrel in treatment costs. Mongrel dogs are likely to have longer lives as well as healthier lives. Whereas the pedigree dogs listed below live on average between 8 and 13 years, according to Churchill Insurance, a mongrel lives on average 16 years.

	Average annual veterinary and other treatment costs*	Average life expectancy
Great Dane	£1697	10 years
Bulldog	£1191	8 years
Bloodhound	£913	9 years
Rottweiler	£768	12 years
Basset Hound	£768	12 years
English Setter	£768	10 years
Boxer	£732	12 years
Springer Spaniel	£715	12 years
Jack Russell Terrier	£607	12 years
Labrador Retriever	£505	13 years
Mongrel	£403	16 years

* NB does not include grooming costs or insurance cost.
(Source: K9 Magazine: www.k9magazine.com)

4. Breeds affected by hereditary hip and elbow dysplasia

Hip and elbow disease can cause both pain and disability when the dog becomes lame. 'Dysplasia' denotes an abnormality of growth or deformity of structure, leading to malformation of the hip joint (coxofemoral joint). Hip dysplasia can include joint looseness, new bone growth (indicating wear and tear) and bone loss, inflammation and pain. Being growth disorders of the bone, they are most prevalent in large and fast-growing dogs. These disorders often eventually cause arthritis, which can be very painful. The dog's behaviour may change from apparent soundness to lameness and inability to take exercise, but the problem may not be apparent because of the stoicism shown by many dogs. [14]

4.1 The British Veterinary Association/Kennel Club (BVA/KC) hip and elbow dysplasia schemes

The existence of breed-related inherited hip and elbow disease is so well known that the BVA and the Kennel Club (KC) run voluntary testing schemes to enable breeders and dog owners to have their dogs' hips X-rayed and scored for hip and elbow dysplasia, so that they can avoid breeding from unhealthy dogs. The X-ray procedure requires the dog to be anaesthetised.

The BVA/KC Hip Dysplasia scheme has been in existence since 1984 (and from 1978 for German Shepherd Dogs) and by January 2006 the BVA recorded that X-rays from over 188,249 dogs had been examined and scored from around 120 breeds. The average score for each breed is denoted the 'breed mean score' (BMS). During 2005, the BVA records that nearly 12,400 dogs were scored. [15] Assuming that both hips score the same, a total score of 20 would indicate a 'mild degree of hip dysplasia' and a total score of 64 would indicate a 'gross degree of hip dysplasia.' [14]

At January 2006, 21% of the breeds tested had a 'breed mean score' (BMS) of 20 or more, indicating that the average condition over the screening period for those breeds was to have some degree of hip dysplasia. These breeds include the Beagle, Pug, Pembroke Corgi, Sussex Spaniel and Bulldog. Breeds with a mean score of between 12 and 19 include the Staffordshire Bull Terrier, Border Collie, Great Dane, Cocker Spaniel, Rottweiler, Shetland Sheepdog, Irish Setter, Labrador Retriever, Boxer, Standard Poodle, Cavalier King Charles Spaniel, German Shepherd dog, Golden Retriever and Old English Sheepdog. The range of individual scores within a breed is often very wide, including scores of up to the maximum of 106, indicating a very severe condition for some dogs in the breed (see Appendix, Table 1, for the scores of selected breeds).[15]

The BVA/KC Elbow Dysplasia scheme was launched more recently in 1998, offering X-ray and scoring of dogs' elbow joints, which are given a score of between 0 and 3.16 According to the BVA and the KC, breeds that are known to have a higher incidence of elbow dysplasia include: Basset Hounds, Bernese Mountain Dogs, English Mastiffs, German Shepherd Dogs, Golden Retrievers, Great Danes, Irish Wolfhounds, Labrador Retrievers, Newfoundlands and Rottweilers. [16]

German Shepherd Dog © Colin Seddon

Golden Retreiver © Colin Seddon

Since hip and elbow dysplasia are known to be inherited, the ethical approach to breeding policy would surely be to breed only from dogs that do not have the condition. A study by the Animal Health Trust on the effectiveness of the scheme for Labrador Retrievers concluded, in 2002: '*Offpring hip scores could be reduced substantially by using only parents with zero hip score*.' [17] However, breeders are free to decide whether or not to breed from a dog after screening. The BVA restricts itself to recommending that only dogs with scores '*WELL BELOW the breed mean scores*' should be used for breeding by breeders '*wishing to reduce the risk of hip dysplasia*,' [15] and that only dogs with grade 0 or 1 for elbow dysplasia should be used for breeding. [16] In the case of hip dysplasia it is obvious that, if the breed mean score is high, a dog with a score well below the mean may still be affected by the disorder.

X-ray of a German Shepherd dog's hips with hip dysplasia. This x-ray was never sent away to be scored. © Emma Milne

The BVA/KC hip screening scheme is entirely voluntary and covers only a relatively small percentage of all the dogs in the breed. Only a small proportion of all the dogs in a breed are used for breeding, and these are the dogs that the scheme is mainly intended for. According to studies by the Animal Health Trust, three quarters of Labrador Retrievers registered with the Kennel Club during 1999 had at least one parent who had been screened, although only 51.9% of these dogs had parents who had both been screened.[17] However, the low percentage may also indicate that some breeders or owners are not committed to the scheme. For example, only 16 Bulldogs have been scored, although the mean score for the breed is high (BMS = 41). [15]

It is also likely that X-rays showing a very bad condition are not submitted to the BVA for scoring, because the problem is obvious. The result is that the scheme scores are not necessarily representative of the prevalence of hip dysplasia in the total dog population of a particular breed. According to a 1997 review of the scheme, '*only a sample of the population [of the breed], rather than the real population, has been evaluated*.' [18]

There is evidence from the US that, for Golden Retrievers and Rottweilers, the prevalence of hip dysplasia may be much higher than indicated by the records of a similar hip screening scheme. A study at the University of Pennsylvania School of Veterinary Medicine, published in 2005, found that X-rays showing normal-appearing hips were 8.2 times more likely to be submitted to the Orthopedic Foundation for Animals hip certification scheme than X-rays showing abnormal hips, and concluded that the 'substantial bias' in the scheme database indicated that '*prevalence of canine hip dysplasia in these 2 breeds may be much higher than previously reported in the United States*.' [19]

X-ray of a Labrador's hips with hip dysplasia. This dog's hips scored 96 out of 106. © Emma Milne

Other estimates of the prevalence of hip and elbow disease exist for some breeds. According to statistics collected in Gough and Thomas's *Breed Predisposition to Disease in Dogs and Cats*, in 1999 it was estimated that 17.8% of Labrador Retrievers had elbow dysplasia and that 12.6% were affected by hip dysplasia. In addition, a large study in 1989 found that 24.6% of Rottweilers were affected by hip dysplasia.[20] In view of the suffering caused by these diseases, it is clearly essential that UK breeders of affected breeds give hip and elbow health high priority in their breeding decisions.

4.2 International studies of the prevalence of hip and elbow dysplasia

Studies from several countries suggest that screening and selective breeding on the basis of the screening results can reduce the prevalence of hip and elbow dysplasia in pedigree dogs. However, screening schemes in themselves do not necessarily achieve this, if breeders continue to select dogs for breeding mainly on the basis of their appearance rather than for their hip and elbow health. A study in Finland published in 2005 concluded that hip and elbow health must be given a major weighting in the selection criteria in order to achieve real improvement over a 10 year period.[4]

In 1984 the Finnish Kennel Club started obligatory testing for hip dysplasia for Golden Retrievers and Labrador Retrievers that were used in breeding, and more breeds have since been added.[4] For some breeds the Finnish KC imposes restrictions on the hip score of dogs used for breeding.[21] Animal scientists at Helsinki University and Wageningen University (Netherlands) have analysed the hip and elbow dysplasia data from the Finnish KC from 1978 to 1999 (Appendix, Tables 2 and 3). These show that, in total, 46.7% of the Rottweilers, 23% of the Golden Retrievers, 18.8% of German Shepherd Dogs and 17.1% of the Labrador Retrievers had some degree of elbow dysplasia (from mild to severe). 38.5% of the German Shepherd Dogs, 32.2% of the Rottweilers, 32.0% of the golden retrievers, 24.7% of the Labrador Retrievers and 13.7% of the Rough Collies screened had some degree of hip dysplasia (from mild to severe).[7]

In spite of the screening programme, a subsequent analysis of 42,421 purebred dog health records of German Shepherds, Golden Retrievers, Labrador Retrievers, Rough Collies, Rottweilers, Bernese Mountain Dogs and Finnish Hounds found that improvement was only modest. The scientists concluded that for hip dysplasia, '*genetic trends between the years 1983 and 1998 were favourable only for the Rottweiler*.' For elbow dysplasia, genetic trends showed '*a*

slight improvement after 1992 in all the four breeds studied.' The reason for the lack of major improvement seemed to be the '*negligible selection pressure against these traits*.'[22]

The Finnish research showed that inbreeding was common and contributed to the continued prevalence of hip and elbow dysplasia. By 1999, typically fewer than 12% of all male dogs of the breeds studied were used for breeding, and fewer than 5% for Golden Retrievers and Labrador Retrievers. It was also found that the inbreeding of Golden Retrievers and Labrador Retrievers had actually increased quite markedly over the period studied, by 12 and 10 percentage points respectively as a proportion of all male dogs that were used for breeding. It was found that for the Labrador and German Shepherd Dog, there was a considerable effect of inbreeding on hip dysplasia, '*such that the most heavily inbred dogs had the worse joints*.'[7]

These scientists concluded, in 2005, that: '*Current dog breeding programmes must be changed if genetic improvement in health and behaviour traits is to be achieved . . . The desired genetic responses for HD, RD and BE [hip dysplasia, elbow dysplasia and behaviour] over a period of 10 years could only be attained by changing the relative selection index weights dramatically in favour of these traits*.'[4]

Elsewhere there is evidence that screening and selective breeding can have success in reducing the proportion of dogs that have hip dysplasia. In the US in the later 1970s, about 30% of dogs screened as candidates for guide dog training were rejected because of poor hip joints.[23] However, a breeding programme at 'Seeing Eye' up to 1996 succeeded in reducing the percentage of German Shepherd Dogs with hip dysplasia at 12 to 16 months of age from 55% to 24% in under 5 generations of breeding. Among Labrador Retrievers, the percentage decreased from 30% to 10%.[23]

In Sweden, the screening and registration of parent dogs' hip joints has been a condition for the registration of puppies with the Swedish Kennel Club since 1984. 17 The screening programme is reported to have succeeded in reducing the prevalence of hip dysplasia in the breeds involved in the study between 1976 and 1989. Moderate to severe hip dysplasia decreased from 16% to 6% in the Rottweiler dogs, and moderate to severe hip dysplasia was reduced by 40-50% in German Shepherd Dogs, Golden Retrievers and Labrador Retrievers.[24] In Finland, however, less success was reported for the period 1988-1995. The prevalence of hip dysplasia actually increased for the Boxer, Doberman, German Shepherd Dog and Rough Collie although there was a significant decrease in hip dysplasia for the Cocker Spaniel, Golden and the Labrador Retrievers and the Rottweiler. The lack of rapid progress has been attributed to the fact that '*breeders' compliance and commitment to programs is not always high and other selection criteria in breeding are thought to be more important*.'[21]

These studies demonstrate that, in order to reduce inherited hip and elbow disease, breeders need to select dogs for breeding on the basis of their hip and elbow health rather than on the basis of their appearance.

5. Breeds affected by inherited eye disease

Between a quarter and one third of the world's dog breeds are known to be affected by at least one inherited eye or eyelid condition. These include abnormalities and disease of the eye lens, retina, cornea and eyeball and can result in partial loss of vision or complete blindness. Inherited conditions include cataracts, the very painful condition glaucoma, and defects of the retina, including retinal detachment and progressive retinal degeneration. In addition many breeds suffer from eyelid and eyelash conditions that can cause inflammation and pain.

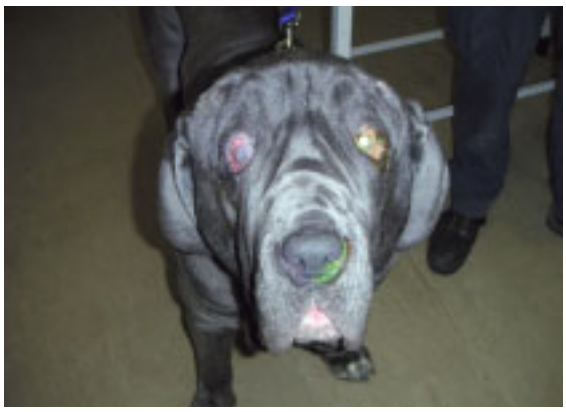
5.1 The British Veterinary Association/Kennel Club/International Sheep Dog Society (BVA/KC/ISDS) Eye Scheme

Cocker Spaniel © Colin Seddon

The BVA/KC/ISDS Eye Scheme exists to screen dogs for specific eye abnormalities and diseases that are either known or suspected to be inherited in breeds. The range of breeds and diseases covered by the scheme shows that eye disease is widespread among the pedigree dog population. As of July 2005, the BVA/KC/ISDS scheme lists 63 breeds that have eye diseases or abnormalities that are known to be inherited in the breed. These 63 breeds account for 31% of the number of breeds registered with the Kennel Club. Eleven eye conditions are known to be inherited and a further 4 are suspected to be inherited.

Border Collie

The 37 breeds covered by the scheme that are known or suspected to inherit



Neapolitan Mastiff with chronic eye ulceration.
© Emma Milne

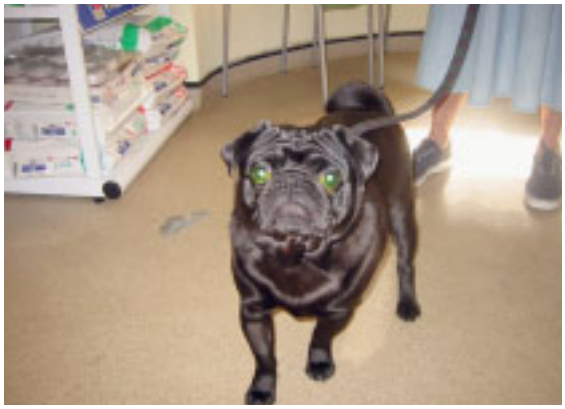
Pekinese, Sophie, after one eye was removed due to chronic eye ulceration.
© Emma Milne

cataract include the Boston Terrier, German Shepherd Dog, Cavalier King Charles Spaniel, Irish Setter, Standard Poodle, Golden Retriever, Labrador Retriever, Siberian Husky, Staffordshire Bull Terrier, Bichon Frise and Border Collie, among others. For primary glaucoma, there are 13 affected breeds, including the Basset Hound, Flat-Coated Retriever, Siberian Husky, Dandie Dinmont Terrier and Great Dane. For degeneration of the retina, the 34 affected breeds include the rough and the Smooth Collie, Border Collie, Miniature Short-Haired Dachshund, Irish Setter, Golden Retriever, Labrador Retriever, Shetland Sheepdog, Cocker Spaniel and Springer Spaniel. The current scheme is only concerned with conditions of the eye itself and excludes eyelid and eyelash conditions which are also breed-related.[25] (See Appendix, Table 4 and Glossary of diseases and affected breeds.)

5.2 Further breed-related eye problems

Other veterinary sources make it clear that there is an even wider range of breed-related eye disorders than those included in the BVA/KC/ISDS eye Scheme.

Some of these problems are associated with breed standards that encourage unnatural features such as very deep set or very protruding eyes.[26] Eyelid and eyelash defects and abnormalities are common breed-related conditions, which can cause eye irritation and severe suffering. These include ectropion (rolling out of the eyelid margin so that the mucous membrane lining of the lid is exposed to the outside); entropion (where the eyelid margin turns inward and irritates the surface of the cornea); distichiasis (where eyelashes are growing in abnormal positions). A condition known as macropalpebral fissure, due to bulging eyeballs in brachycephalic breeds (those bred to have very short or flat faces), allows both entropion and ectropion to develop leading to 'diamond eye', and corneal/conjunctival disease.[20]



Pug after bilateral entropian surgery due to eyelids growing inwards.
© Emma Milne

Dogs bred for loose skin on the face may also suffer from eye irritation known as nasal fold trichiasis. In the Pekinese and other breeds, prominent skin folds around the nose result in facial hair coming in contact with and irritating the eye tissues.[20]

The textbook by Gelatt, *Essentials of Veterinary Ophthalmology* (2000) lists 17 inherited eye conditions (or groups of conditions) and 100 dog breeds associated with one or more of these conditions. Eyelid defects are listed for 58 breeds, including the Akita, Basset Hound, Bedlington Terrier, Boston Terrier, English Bulldog, Cardigan Welsh Corgi, Cavalier King Charles Spaniel, Shar Pei, Chow Chow, American Cocker Spaniel, Collie, Dachshund, Dalmation, English Cocker Spaniel, English Springer Spaniel, Golden Retriever, Labrador Retriever, Pug, Rottweiler, St Bernard, Samoyed, Shetland Sheepdog and Siberian Husky.

Pekinese. © Colin Seddon

St Bernard © Colin Seddon

Gelatt's textbook also lists 20 breeds affected by hereditary glaucoma and 75 breeds affected by cataract. A large

number of breeds also inherit problems with the retina; 25 breeds are affected by some form of retinal dysplasia (malformation or detachment of the retina) and 44 breeds are affected by degeneration of the retina (Appendix, Table 5).[27]

The health of the Cavalier King Charles Spaniel

Cavalier King Charles Spaniel
© Colin Seddon

Eye problems

The Cavalier King Charles Spaniel breed is known to suffer from 8 eye problems, listed by Gough and Thomas in their 2004 book, *Breed Predisposition to Disease in Dogs and Cats*. These breed-related eye problems are: entropion, distichiasis, dry eye, corneal dystrophy (opacity of the cornea), cataract, multifocal retinal dysplasia, generalised progressive retinal atrophy and multiocular defects. [20] Multiocular defects can include microphthalmia (a congenitally small eye). [27]

Heart and breathing problems

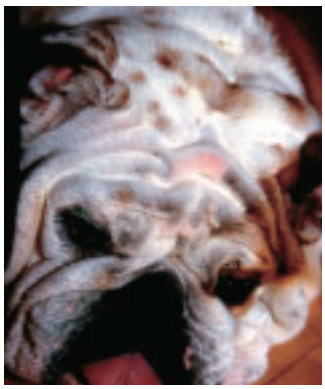
In addition to the brachycephalic upper airway syndrome, the Cavalier King Charles Spaniel suffers from a high risk of cardiovascular conditions, especially endocardiosis (chronic degeneration of the heart valves, leading to heart failure). The risk of endocardiosis has been estimated to be 20.1 times increased in this breed, and 59% of UK Cavaliers over 4 years old have been recorded as having a heart murmur. Patent ductus arteriosus is another common congenital abnormality in the breed (a condition where the ductus arteriosus fails to close after birth). [20]

6. Breeds affected by heart and respiratory disease

Any veterinary textbook will provide numerous examples of breed-related heart and respiratory problems that are recognised by the veterinary profession. Breathing difficulties and heart disease can cause suffering and disability and prevent the dog from leading a normal active life. Heart disease can also cause sudden death, even in young dogs. According to the textbook Cardiorespiratory diseases of the dog and cat, by Martin and Corcoran (1997), '*Breed factors need to be considered, particularly in cardiac disease where there are numerous examples of breed-related problems. Several respiratory conditions are also seen more frequently in particular breeds*.' The textbook lists 16 heart and respiratory conditions associated with 34 breeds (see Appendix, Table 6).[28]

6.1 Brachycephalic Upper Airway Syndrome

One of the most obvious breed-related problems is known as Brachycephalic Upper Airway Syndrome, which affects brachycephalic breeds, those bred to have unnaturally short noses and flat faces. The syndrome is '*A complex group of anatomical deformities affecting several (brachycephalic) breeds which results in varying degrees of upper airway obstruction*'. These anatomical deformities can include stenotic (abnormally narrow) nostrils, a soft palate that is too long compared to the length of the dog's face and so obstructs breathing, laryngeal deformities and hypoplastic



British Bulldog © Colin Seddon

Pug © Colin Seddon

Pug with breathing difficulty. © Emma Milne

(incompletely developed) trachea. Commonly affected breeds include the English Bulldog, Pekinese, Pug and Cavalier King Charles Spaniel. Dogs with Brachychephalic Upper Airway Syndrome often have difficulties in breathing, breathe noisily and snore and sometimes lose consciousness. They can develop chronic bronchitis and damage to their lungs. Their symptoms may worsen if they exercise or become too hot. On this syndrome, veterinarians have commented: '*Selective breeding programmes to remove these anatomic deformities would be the ideal long-term approach to this problem*.'[28]

Brachycephalic dogs are also more disposed to heart disease. A Royal Veterinary College study of 92 dogs of 6 breeds, published in the *Veterinary Record* in 2004, found that 53% of the brachycephalic dogs in their sample had heart disease, compared to 24% of the non-brachycephalic dogs. The brachycephalic dogs also tended to have greater variability in heart rate. The authors suggest that the differences in heart rate variability between breeds of dog may be due to the '*greater inspiratory effort required by the brachycephalic morphology*' 29; in other words flat-faced dogs have to make a greater effort to breathe.

While it is clear that breeding for an abnormal head shape has created the Brachycephalic Upper Airway Syndrome, the opposite head shape can also cause problems for dogs. Dogs bred to have excessively long and narrow heads, such as Greyhounds and Collies, are known as dolichocephalic. These dogs can develop chronic nasal disease caused by infection by fungal spores that they have inhaled.[28]

6.2 Increased risk of heart conditions

It is well known to veterinarians that a number of pedigree dog breeds have a considerably increased risk of heart conditions compared to the general dog population.

According to *Breed Predispositions to Disease in Dogs and Cats*, about 6.5 per thousand purebred dogs have the heart condition known as dilated cardiomyopathy, compared to 1.6 per thousand mixed-breed dogs, an increase of 4-fold for purebreds. The prevalence of dilated cardiomyopathy for certain breeds is very much higher: 3.4% for Boxers (ie 3.4 Boxers per hundred, rather than the average for purebred dogs of 6.5 per thousand); 2.6% for St Bernards; 5.8% for Dobermans. The Dobermann breed has a 33.7 times increased risk of this condition, and accounts for around 50% of all cases of the disease in dogs. In addition, 34% of young Beagles have been recorded with the condition coronary artery vasculitis.[20]

Boxer © Colin Seddon

Doberman © Colin Seddon

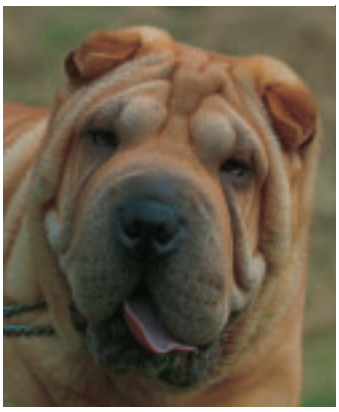
Certain breeds carry a many-fold increased risk of specific cardiovascular diseases (Appendix, Table 7). Relative risk is defined as the risk of the disease occurring in the breed compared to the risk of the disease occurring in the general dog population; hence a relative risk of 1.0 indicated no increased risk for the breed and a relative risk of 5.0 indicates that the disease is 5 times more likely to occur in the breed than in the general dog population. The risk of aortic stenosis (a congenital disease involving obstruction of blood flow from the heart) is increased 9.3 times for a Boxer, over 5 times for a bulldog, 6.8 times for a Golden Retriever, 5.4 times for a Rottweiler and 2.6 times for a German Shepherd dog. In addition to this, the Bulldog has an increased risk of 12.9 times for pulmonic stenosis and 5.0 times for ventricular septal defect.[20]

The risk of pericardial effusion (a build-up of fluid around the heart, most likely to affect large or giant dogs) is increased 1.5 times for the Boxer, 7.4 times for the Golden Retriever, 2.3 times for the German Shepherd dog and 2.2 times for the Labrador Retriever. The risk of endocardiosis is increased 20.1 times for the Cavalier King Charles Spaniel, 4.1 times for the Pekinese, 3.1 times for the Toy Poodle, 3.3 times for the Shih Tzu and 2.6 times for the Yorkshire Terrier. The West Highland White Terrier has an increased risk of 4.2 times for pulmonic stenosis, 13.4 times for ventricular septal defect and 14.1 times for Tetralogy of Fallot (four simultaneous heart abnormalities).[20] (Appendix, Table 7.0)

It is therefore well established that certain breeds of dog have a very much increased risk of pain, suffering and disability as a result of heart conditions, and that these conditions are much more prevalent in some pedigree breeds than in thoroughly mixed-breed dogs. These facts underline the need for urgent reform of pedigree breeding practices to reduce or eliminate inherited and breed-related heart and breathing problems in dogs.

7. Breed-related skin diseases

West Highland White Terrier
© Colin Seddon



Shar Pei © Colin Seddon

Skin diseases often cause itching, inflammation and painful open sores or ulcers and lead to the infection of broken skin and sores by bacteria. Skin disease can be a major welfare problem for the dog and stressful for the owner. Veterinary textbooks make it clear that pedigree dog breeds are predisposed to a number of distressing skin complaints. P B Hill, of the Royal (Dick) School of Veterinary Studies, University of Edinburgh, a specialist in veterinary dermatology, states that skin diseases '*show striking breed predilections*.'[30] In Hill's textbook, *Small animal dermatology. A practical guide to the diagnosis and management of skin diseases in dogs and cats* (2002), breed-related skin diseases are listed for 56 dog breeds plus the Persian cat (see Appendix, Table 8).

The textbook by Patterson, *Skin Diseases of the Dog* (1998), tells us that the Cocker and Springer Spaniels, West Highland White Terrier, Basset and Shar Pei are predisposed to seborrhoea, a disease that is initiated by overproduction of the skin's sebaceous glands. Starting with mild scaling, the disease progresses to dry generalised seborrhoea in the Irish setter and Dobermann and to greasy, smelly skin with itchy patches in the Cocker Spaniel, West Highland White Terrier, Basset Hound and Shar Pei. Collies and Shetland Sheepdogs are predisposed to dermatomyositis, an ulcerative dermatitis that causes very painful lesions in the groin and axilla (corresponding to the human armpit) and sometimes in the eyelids, mouth, anus and external genitalia.[31]

Dogs bred to have loose or drooping skin are most likely to suffer from skin fold dermatitis (intertrigo). Skin fold dermatitis is caused by friction between skin surfaces, and leads to ulceration, exudation of pus and fluid, surface infection and foul odour. Sores due to intertrigo are found in the areas where there are skin folds in the different affected breeds. The Boston Terrier, Bulldog, Pekinese, Pug and Persian cats are affected in the skin folds on their faces. The Cocker Spaniel, Springer Spaniel and St Bernard are affected in their lip folds. The Basset Hound and the Shar Pei are affected in their body skin folds and the Boston Terrier, Bulldog and Pug are affected in their tail skin folds.[30]

Allergic skin disease (atopic dermatitis) can cause great distress to the dog (and owner). Breeds predisposed to atopic dermatitis include the Basset Hound, Boxer, Bulldog, Cocker Spaniel, Dalmatian, German Shepherd, Golden Retriever, Labrador Retriever, Old English Sheepdog, Pug, Shar Pei and West Highland White terrier (Appendix, Table 8).

Some of these breeds have a greatly increased risk of skin disease compared to the general dog population. According to statistics collected by Gough and Thomas in *Breed predisposition to disease in dogs and cats*, Boxers have an increased risk of 5.8 times for allergic skin disease and an increased risk of 4.3 times for food hypersensitivity. Golden Retrievers have an increased risk of 2.3 times for both allergic skin disease and pyotraumatic folliculitis ('hot spot' or 'wet eczema'). The Old English Sheepdog, which is bred to have copious fur on its feet, has a increased risk of 28.9 times for pododemodicosis (a skin disease caused by infection of the feet with the *Demodex* mite).[20]

These established facts of the greatly increased risk of skin disease for some pedigree dogs underline the need to reform breed standards and breeding practices. In particular, breed standards that require or encourage skin folds clearly damage the welfare of the dogs and cannot be justified.

Old English Sheepdog © Colin Seddon

8. Inherited skeletal problems of small and long-backed breeds

Dogs bred to have very short legs in comparison to the rest of their bodies, or bred to be very small with fine legs, are predisposed to problems with their legs and backs. These problems are likely to cause pain and disability and can prevent the dog from leading a normal active life and taking exercise. The dogs may have to be prevented from carrying out normal domestic activities such as climbing up and down stairs and jumping in order to protect them from potential damage.

8.1 Luxating patella

Luxation of the patella is the dislocation of the patella ('knee-cap'). It is most common in toy and small breeds of dog, although not exclusively so. According to Black's Veterinary Dictionary, 21st edition, 2005, '*Dislocation of the patella (patellar luxation) may occur as an inherited abnormality in certain breeds of dogs, eg Boston Terriers, Boxers, Bulldogs, Cairn Terriers, Chihuahuas, Wire Fox Terriers, Griffons, Pekinese, Maltese, Papillons, Pomeranians, Poodles, Labradors, Scotch Terriers, King Charles Spaniels*.' The Canine Inherited Disorders Database of the University of Prince Edward Island also lists the breeds Yorkshire Terrier, Basset Hound, Shih Tzu, Silky Terrier, and Lhasa Apso as breeds in which patella luxation is inherited.[32]

A dislocated knee-cap makes the dog lame and over time the dog may develop other degenerative joint changes, such as osteoarthritis. According to the Canine Inherited Disorders Database, any affected dog or its parents and litter-mates should not be used for breeding.[32]

Lhasa Apso © Colin Seddon

8.2 Intervertebral disc disease in chondrodystrophoid breeds

'Chondrodystrophoid' denotes faulty development of cartilage. The condition is related to dwarfism, and particularly affects dog breeds that have disproportionately short legs compared to the length of their bodies, such as Dachshunds. Several other breeds, such as the Miniature Poodle, Pekingese, French Bulldog, Beagle, Basset Hound, American Cocker Spaniel, Shih Tzu, Lhasa Apso and Welsh Corgi are also identified as chondrodystrophoid.[32]

Dachshund. © Colin Seddon

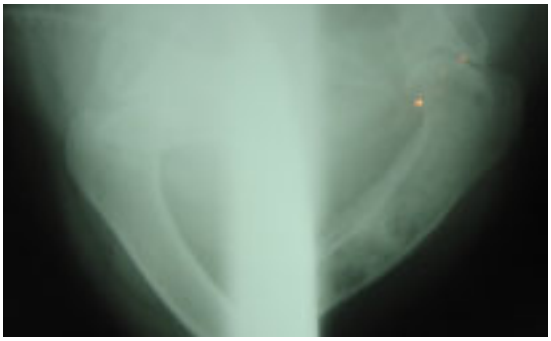
Long-haired Pembrokeshire Corgi © Colin Seddon

According to Brinker, Piermattei, and Flo's *Handbook of Small animal orthopedics and fracture repair*, chondrodystrophoid breeds are also prone to arthritis due to a number of causes, to luxating shoulder and patella and to inflammatory joint disease.[33]

The intervertebral discs of chondrodystrophoid breeds have been shown to differ from those of non-chondrodystrophoid dogs in both structure and biochemistry. These dogs were bred to have short, thick legs and, although this characteristic is normal for the breed, it is the result of abnormal development of cartilage. As a result, chondrodystrophoid breeds such as the Dachshund, Basset Hound and Corgi are particularly prone to intervertebral disc disease. The disease occurs when the jelly-like inner layer of the disc protrudes, or herniates, into the vertebral canal and presses on the spinal cord.[32]

According to the Canine Inherited Diseases Database, disc herniation occurs at a relatively young age (3 to 6 years) in affected breeds, often at several sites in the back, and causes mild to intense pain. In severe cases, the disease causes paralysis, loss of sensation, and lack of bladder and bowel control and may be irreversible.[32] Normal activities such as jumping increase the risk of the disease. An estimate by the Dachshund Club of America in 1993 was that 1 in 4 Dachshunds had some degree of disc-related problems during their lives. The Club recommended that owners of chondrodystrophoid dogs should be advised of the potential risks by their veterinarians when they see the dogs as puppies.[34]

In chondrodystrophoid breeds an abnormal developmental feature (dwarfism) has become accepted as a breed standard. In view of the suffering caused to dogs such as Dachshunds, it is clearly time for the breed standard to be revised.



X-ray showing osteosarcoma bone tumour in Boxer.
© Emma Milne

Boxer requiring surgery on osteosarcoma bone tumour.
© Emma Milne

9. Bone tumours in large and giant dog breeds

Large or giant breeds of dog are more likely to develop bone tumours. According to Morris and Dobson's textbook *Small animal oncology* (2001), bone tumours are associated with rapid bone growth during early development, when large dog breeds are growing extremely fast, and with bone stress due to weight-bearing. There may also be a genetic predisposition in the large and giant breeds.[35]

According to Morris and Dobson, '*bone tumours of the appendicular skeleton occur with increasing frequency with increasing size/body weight and predominantly affect large – giant breeds. So great is this size relationship that primary bone tumours are rare in dogs less than 15kg, yet common in breeds such as the Irish Wolfhound, Great Dane, Rottweiler and St Bernard*.'[35]

Five-year-old Rottweiler with chrondrosarcoma tumour on toe.
© Emma Milne

Close-up of Rottweiler' foot with chrondrosarcoma tumour.
© Emma Milne

10. Hereditary deafness

A dog born totally deaf (congenital deafness in both ears) is unable to lead a normal free-running life. The dog is very difficult to train, is easily surprised and may react aggressively when startled. He or she is also more likely to be involved in car accidents. The British Dalmatian Club recommends that dogs born completely deaf should be euthanased.[36]

According to a review of hereditary deafness in a 1997 symposium on inherited disease in dogs, 7.4% of the Dalmatians tested at 3 hearing clinics in the UK up to the end of 1996 were found to be totally deaf. In addition, the Animal Health Trust has found that 2.8% of Border Collies tested were totally deaf.[36]

While many people are aware that Dalmatians are prone to hereditary deafness, several other breeds are also affected. Most of these breeds have been bred to be largely white or piebald and hereditary deafness is associated

Dalmatian. © Colin Seddon

with the genes for the piebald and the merle coat colour. The Animal Health Trust has also diagnosed congenital deafness in a significant percentage of English Bull Terriers, White Boxers, Harlequin Great Danes and Jack Russell Terriers. Other breeds reported as affected include Beagles, Bull Dogs, Shetland Sheepdogs, Dappled Dachshunds, and Old English Sheepdogs, among others. According to studies published in the mid-1990s, in the USA total deafness affected 2.4% of English setters, 1.8% of English Cocker Spaniels, and 1.5% of White Bull Terriers.[36]

A significantly higher proportion of dogs may be deaf in only one ear but, because they behave normally, this problem may not be noticed unless they are tested (see Appendix, Table 9). According to the British Dalmatian Club, in the late 1990s, 14% of Dalmatians were deaf in one ear. Deafness in one ear still presents a problem if these dogs are used for breeding, since their offspring have an increased risk of being born deaf.[36]

A particular coat colour is a purely cosmetic feature. If current veterinary opinion is that the piebald and merle coat colours predispose dogs to deafness, then the breed standards that encourage these coat colours should be revised.

The health of the English Bulldog

The following information is given on the website for pet owners, petplanet.co.uk, as advice to potential dog owners about the characteristics and health of the Bulldog breed:

'General physical description'

The overall look of the dog should be powerful and vigorous with a short, sturdy (not stout) body and a peculiar rolling gait. One of the distinctive elements of the Bulldog is its loose skin, especially at the head, neck and shoulders. Another distinctive feature is the massive skull. The Bulldog sort of shuffles along in a loose-jointed manner with some sidewise motion, but he should still be able to move freely and with vitality.

Ailments

Due to all these physical eccentricities, the Bulldog is beset by a bevy of health problems. Elbow and patellar [knee-cap] dysplasia are not uncommon and all breeding dogs should be screened for these two diseases. Hip dysplasia can occur but it is difficult to screen for and score accurately in Bulldogs due to their unique anatomy. Due to the massive head and relatively narrow hips the Bulldog usually delivers by caesarian section. Another breeding problem plaguing Bulldog breeders is the male dog's frequent inability to mate. As a result, many litters are conceived via artificial insemination. Mange is a further problem that seems to attack Bulldogs. Also worth mentioning is the fact that Bulldogs are not tolerant of heat.

British Bulldog. © Colin Seddon

Common Ailments

Heat intolerance, anascara [swelling in tissues below skin], inability to mount in mating, uterine inertia [labour fails to occur], pulmonic stenosis, ventricular septal defect, inherited metabolic liver defect, deafness.

Susceptibility to Illness

High. Gough and Thomas's Breed Predisposition to Disease in Dogs and Cats lists predispositions to over 50 disorders for the Bulldog, including the following: ventricular septal defect, Tetralogy of Fallot, aortic stenosis, pulmonic stenosis, pododermatitis, generalized demodicosis, intertrigo (which 'may occur due to intentional breeding for excessive skin folding'), congenital elbow luxation, congenital deafness, hydrocephalus, primary brain tumour, entropion of lower eyelid, 'diamond eye', distichiasis, 'dry eye', prolapse of the gland of the nictitating membrane ('cherry eye'), corneal ulceration, multifocal retinal dysplasia, achondroplasia ('genetic dwarfism accepted as breed standard'), hypoplastic trachea, dystocia (problems giving birth, 'due to combination of narrow pelvis and large head/wide shoulders') and brachycephalic upper airway syndrome ('likely to be a consequence of selective breeding for certain facial characteristics').[20]

11 . The Council of Europe and breed standards

In 1987 the Council of Europe agreed a *European Convention for the Protection of Pet Animals* (European Treaty Series No. 125), which recognised the issue of breed-related disorders in Article 5:

> Article 5 – Breeding: *Any person who selects a pet animal for breeding shall be responsible for having regard to the anatomical, physiological and behavioural characteristics which are likely to put at risk the health and welfare of either the offspring or the female parent*.[37]

18 European countries have signed and ratified the Convention: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Lithuania, Luxembourg, Norway, Portugal, Romania, Sweden, Switzerland and Turkey. Of these countries, eight signed and ratified the Convention with 'reservations' exempting them from certain articles, but none of them exempted themselves from Article 5 on breeding. A further two countries (Italy and the Netherlands) signed the Convention in 1987 but have not subsequently ratified it and Azerbaijan signed the Convention in 2003 but has not ratified it. The UK is not a signatory.[38]

In 1995 a Multilateral Consultation by the signatories to the Convention passed a detailed Resolution on breeding. The Resolution has no binding legal force but consists of recommendations aimed at facilitating the implementation of Article 5 of the Convention. In essence, this calls for dog and cat breeding associations to revise their breed standards and breeding policy in order to eliminate a number of breed-related disorders and 'extreme characteristics detrimental to the health and welfare of the animals'. The Resolution states that the signatories are '*Convinced that these problems are related for a large part to the way breeding standards are formulated and interpreted*.' The signatories further agreed,[26]

'*If these measures are not sufficient, to consider the possibility of prohibiting the breeding and for phasing out the exhibition and the selling of certain types or breeds when characteristics of these animals correspond to harmful defects such as those presented in the Appendix*.'

The breed characteristics that the Resolution considers sufficiently harmful they need to be changed are:

Extremes of size (large or small)
Extreme shortness of skull and nose
Extremes of back length compared to leg length
Bowed or abnormally positioned legs
Abnormally deep set or protruding eyes
Excessively long ears
Skin folds
Other extreme physical abnormalities such as hairless animals

The Appendix to the Resolution sets out the following guidelines for the revision of breeding policies. The points raised by these guidelines are so important for the improvement of pedigree dog health and welfare that it is worth reproducing them in full: [26]

'*The Parties strongly encourage cat and dog breeding associations to revise their breeding policies in the light of Article 5 of the Convention taking account in particular of the following guidelines*:

Guidelines for the revision of breeding policies:

- *set maximum and minimum values for height or weight of very large or small dogs, respectively, to avoid skeleton and joint disorders (e.g. dysplasia of hip joints or elbows, fractures, luxation of elbow or patella, persistent fontanella) and collapse of trachea;*
- *set maximum values for the proportion between length and height of short-legged dogs (e.g. Bassethound, Dachshund) to avoid disorders of the vertebral column;*
- *set limits to the shortness of skull, respectively nose, so that breathing difficulties and blockage of lachrymal ducts are avoided, as well as disposition to birth difficulties (e.g. Persian cats, especially the "extreme type", Bulldogs, Japan Chin, King Charles Spaniel, Pug, Pekin Palacedog);*

prevent the occurrence of:

- *a persistent fontanella (e.g. Chihuahua) to avoid brain damages;*
- *abnormal positions of legs (e.g. very steep line of hind legs in Chow Chow, Norwegian Buhund, Swedish Lapphund, Finnish Spitz; bowed legs in Basset Hound, Pekin Palace dog, Shi Tzu) to avoid difficulties in movement and joint degeneration;*
- *abnormal positions of teeth (e.g. brachygnathia in Boxers, Bulldogs, Persian Cats) to avoid difficulties in feeding and caring for the newborn;*
- *abnormal size and form of eyes or eyelids (e.g. ectropion: Bassethound, Bloodhound, St. Bernard;*

small deep lying eyes with disposition to entropion: Airedale Terrier, Australian Terrier, Bedlington Terrier, Bullterrier, Bloodhound, Chow Chow, English Toy Terrier, Jagdterrier, Newfoundland, Shar Pei; large, protruding eyes: Boston Terrier, Cavalier King Charles Spaniel, Dandie Dinmont Terrier, Brussels Griffon, Japan Chin, King Charles Spaniel, Pug, Pekin Palacedog, Shi Tzu, Tibet Terrier) to avoid irritation, inflammation and degeneration as well as prolapse of eyes;

- *very long ears (e.g. English Cocker Spaniel, Basset Hound, Bloodhound) to avoid disposition to injuries;*
- *markedly folded skin (e.g. Basset hound, Bulldog, Bloodhound, Pug, Pekin Palacedog, Shar Pei) to avoid eczemas and in the case of furrows around the eyes irritation and inflammation of eyes;*

avoid or, if it is not possible to eliminate severe defects, discontinued breeding of:

- *animals carrying semi-lethal factors (e.g. Entlebucher Cattledog);*
- *animals carrying recessive defect-genes (e.g. homozygotic Scottish Fold Cat: short legs, vertebral column and tail defects)*
- *hairless dogs and cats (lack of protection against sun and chill, disposition to significant reduction of number of teeth, semi-lethal factor)*
- *Manx-cat (movement disorder, disposition to vertebral column defects, difficulties in elimination of urine and faeces, semi-lethal factor)*
- *cats carrying "dominant white" (significant disposition to deafness);*
- *dogs carrying "Merle factor" (significant disposition to deafness and eye disorders, e.g.: Blue Merle Collie, Merle Sheltie, Merle Corgie, Merle Bobtail, Tigerdogge, Tigerteckel).*

Note
The breeds mentioned in brackets are only examples in which these problems may occur.'

The participants who agreed the Resolution were veterinarians representing the following Parties to the Convention: Belgium, Denmark, Finland, Germany, Portugal, Sweden and Switzerland. Representatives of Italy, the Netherlands, Czech Republic, France, Hungary and the USA participated as observers (not being Parties to the Convention). The UK (not a Party to the Convention) did not participate. Organisations that participated in the role of expert observers included the European Pet Organization, the Federation of Veterinarians of Europe, the International Cynologic Federation, the World Cat Federation, the International Feline Federation and The Governing Body of the Cat Fancy, among others. The participating organisations did not include any of the Kennel Clubs of European countries.[39]

11.1 Views of companion animal organisations on dog breeding

The RSPCA, in its current Policies on animal welfare states: *'The RSPCA is opposed to the breeding of animals which produces changes in bodily form or function which are detrimental to their health or quality of life.'*[40]

The Dogs Trust believes that the UK should sign and ratify the European Convention for the Protection of Pet Animals and states: *'The Dogs Trust is very concerned at the welfare issues raised by breeding of dogs. It is clear that breeding from animals with extreme body characteristics leads to offspring with similar problems and we would like to see such practices stopped, as is stated in Article 5 of the Council of Europe Convention on Pet Animals, by responsible breeding'*.[41]

The Kennel Club is not in favour of the UK signing and ratifying the European Convention for the *Protection of Pet Animals* and is also not in favour of the regulation of pedigree dog breeding. The KC commented in its written evidence to the House of Commons Environment, Food and Rural Affairs Committee sub-committee on the draft *Animal Welfare Bill* in September 2004:

'We welcome the Government's assertion that there is no urgency to ratify the European Convention for the Protection of Pet Animals and that the breeding out of characteristics can only be achieved with the co-operation of breed societies. The Kennel Club continues to work closely with societies to eradicate any problems that may exist and we agree with the summation that this is an area for voluntary schemes rather than regulation.'[42]

12. Conclusions and recommendations

This report has shown that current practices of pedigree dog breeding have created serious problems for the welfare of many dogs and for their owners. The problems have arisen because breeding goals have been, and too often still are, based on the dog's appearance rather than on its health.

Breeding that aims for all dogs in the breed to approximate to the 'Breed Standard' in appearance has led to a situation where there are several hundred predisposed and inherited diseases and abnormalities that are known to affect pedigree dogs. These include joint deformities and arthritis, eye disease, skin disease, heart and respiratory conditions, and knee and back problems, many of these causing pain, distress or disability to the dog, often leading to premature death or euthanasia. These man-made conditions represent an enormous burden of ill-health and suffering for dogs and financial cost for dog owners.

These health problems have been caused by two related practices. Breed standards often require dogs to have physical characteristics that can be considered to be close to physical abnormalities and in themselves cause health problems for the dog. Common examples of detrimental features required by breed standards are: a very short face and nose; a disproportionately long back and short legs; loose skin, wrinkles and skin folds; excessively bulging or deep set eyes; excessively long ears and hair; extremes of size (small or large). The related practice of inbreeding greatly restricts the gene pool for the breed and increases the likelihood of puppies inheriting deleterious genes and suffering from inherited disease.

The veterinary profession and the Kennel Club (UK) have long been aware of the problems and have set up voluntary health schemes to screen dogs for inherited hip and elbow disease, eye disease and some other conditions where DNA tests are available. The screening schemes allow breeders and other pedigree dog owners to avoid breeding from unhealthy dogs. Other breed societies support screening for particular inherited diseases. While welcome, these tests are not compulsory, thus reducing their effectiveness. Advocates for Animals believes that many veterinary practitioners are concerned about the health and welfare implications of pedigree breeding but feel unable to voice these concerns in public, since a large proportion of the dogs they treat are pedigrees.

Advocates for Animals believes that the following steps should be taken to reverse the damage done by inappropriate pedigree breeding and to improve the welfare of dogs:

- The UK should sign and ratify the European Convention on Pet Animals and take steps to implement Article 5 of the Convention, taking into consideration the guidelines recommended in the 1995 Resolution on breeding of the Multilateral Consultation on the Convention (see Section 9.0 above). This would substantially modify extreme breed standards.

- The Kennel Club and other breed societies should require compulsory screening of dogs for known breed-related disorders before any dog is used for breeding. Registration of puppies should be made dependent on health screening of parent dogs, with appropriate certification and endorsement of their pedigree records.

- Breeders should make the primary goal of their breeding policies the functional health of the dogs in their breed, and this aim should be reflected in the criteria for selection of dogs for breeding.

In addition, Advocates for Animals believes that veterinarians and members of the public also have an important role to play in the improvement of dog health and welfare.

- We urge veterinarians to be proactive in their approach to the welfare problems caused by pedigree dog breeding, both within the profession and with the general public, and to educate owners and potential owners of pedigree dogs about the issues raised in this report.

- We urge members of the public not to support current pedigree dog breeding practices and therefore to avoid buying pedigree dogs from breeders or attending pedigree dog shows.

- We urge everyone who is thinking of becoming a dog owner to choose to give a home to a mixed-breed dog from a rescue centre, or to a pedigree dog from one of the many breed rescue organisations.

Appendix.
Scientific assessments of the prevalence of breed-related disorders in pedigree dogs

Table 1: Selected hip dysplasia (HD) scores for some well-known breeds. Source: BVA/KC Hip Dysplasia scheme score chart as of 01/01/06. [15]

Note on the scores: Best condition = 0, worst condition = 106

As an example, a total score of 20, if both hips scored the same, would indicate a 'mild degree of HD' in each hip; a total score of 64, if both hips scored the same, would indicate a 'gross degree' of HD in each hip.[14]

Table 1A. Breed Mean Score below 20.

Breed (total number of dogs of this breed which have been scored)

Breed (total number of dogs of this breed which have been scored)	Breed Mean Score (both hips) at 01/01/06 (at 01/01/05)	Rangeof Scores of individual dogs at 01/01/06
Saluki (37 dogs)	5 (5)	0 – 14
Irish Wolfhound (70 dogs)	6 (6)	0 – 86
Smooth Collie (57 dogs)	6 (6)	0 – 17
Basenji (28 dogs)	7 (7)	0 – 14
Bull Terrier (13 dogs)	7 (7)	0 – 12
Siberian Husky (2700 dogs)	7 (7)	0 – 43
Flat-Coated Retriever (4659 dogs)	9 (9)	0 – 85
Rough Collie (772 dogs)	12 (12)	0 – 89
Staffordshire Bull Terrier (34 dogs)	12 (12)	6 – 23
Border Wollie/Working Sheepdog (5817)	13 (13)	0 – 89
English Springer Spaniel (645 dogs)	13 (13)	0 – 102
Great Dane (268 dogs)	13 (13)	0 – 59
Labradoodle (16 dogs)	13 (nd)	7 – 22
Miniature Schnauzer (15 dogs)	13 (13)	4 – 32
Rottweiler (10802 dogs)	13 (13)	0 – 99
Soft Coated Wheaten Terrier (367 dogs)	13 (13)	2 – 62
Chow Chow (684 dogs)	14 (14)	0 – 102
Cocker Spaniel (584dogs)	14 (15)	2 – 89
Giant Schnauzer (149 dogs)	14 (14)	0 – 75
Shetland Sheepdog (246 dogs)	14 (15)	0 – 100
Irish Setter (826 dogs)	15 (15)	0 – 100
Labrador Retriever (50139 dogs)	15 (15)	0 – 106
Standard Poodle (446 dogs)	15 (15)	4 – 74
Boxer (337 dogs)	16 (16)	0 – 64
Cavalier King Charles Spaniel (263 dogs)	16 (16)	2 – 92
Miniature Poodle (21 dogs)	16 (16)	6 – 58
Shar Pei (60 dogs)	17 (18)	4 – 81
Mastiff (266 dogs)	18 (17)	0 – 81
American Bulldog (188 dogs)	19 (20)	5 – 102
English Setter (2463 dogs)	19 (19)	0 – 95
German Shepherd Dog (36671 dogs)	19 (19)	0 – 106
Golden Retriever (28190 dogs)	19 (19)	0 – 106
Old English Sheepdog (1476 dogs)	19 (20)	0 – 100

Table 1B. Breed Mean Score of 20 or over – selected breeds.

Breed (total number of dogs in breed which have been scored) (at 01/01/05)	Breed Mean Score (both hips) at 01/01/06	Range of scores of individual dogs at 01/01/06
Swedish Lapphund (12 dogs)	20 (20)	7 – 67
Beagle (30 dogs)	22 (24)	10 – 60
Bloodhound (31 dogs)	22 (22)	8 – 62
Pug (19 dogs)	22 (23)	8 – 53
St Bernard (383 dogs)	22 (22)	0 – 73
Standard Schnauzer (25 dogs)	23 (23)	6 – 70
Welsh Corgi (Pembroke) (28 dogs)	24 (25)	9 – 58
Bullmastiff (915 dogs)	27 (27)	0 – 104
Newfoundland (3498 dogs)	27 (27)	0 – 106
Sussex Spaniel (118 dogs)	37 (37)	7 – 101
Clumber Spaniel (547 dogs)	40 (41)	0 – 102
Russian Black Terrier (20 dogs)	40 (41)	8 – 90
Bulldog (16 dogs)	41 (41)	10 – 88
Otterhound (148 dogs)	43 (43)	4 – 106

Table 2 Finnish Kennel Club elbow joint screening: data from the Finnish KC from 1978 to 1999. Percentage of dogs in breed with elbow score for dysplasia (approx. 2000 or more dogs from each breed) Source: Mäki et al, 2001: [7]

Breed (number of dogs tested)	0.0 healthy or borderline	1.0 mild	2.0 moderate	3.0 severe
German Shepherd (2566)	81.2 %	14.1%	3.2 %	1.4 %
Golden Retriever (2119)	77.0%	18.4 %	3.4 %	1.3 %
Labrador Retriever(1985)	82.9 %	11.7%	3.5 %	1.8 %
Rottweiler (2972)	53.3 %	34.0 %	10.9 %	1.9 %

Table 3. Finnish Kennel Club hip joint screening: data from the Finnish KC from 1978 to 1999. Percentage of dogs in breed with hip score for dysplasia (approx. 4000 or more dogs from each breed) Source: Mäki et al, 2001: [7]

Breed (number of dogs tested)	0.0 healthy	0.5 healthy	1.0 borderline	2.0 mild	3.0 moderate	4.0 and 5.0 severe
German Shepherd (12302)	26.7 %	4.9 %	29.8 %	22.1 %	12.5 %	3.9 %
Golden Retriever (7872)	36.3 %	6.4 %	25.2 %	17.7 %	12.1 %	2.2 %
Labrador Retriever (7130)	47.8 %	8.1 %	19.4 %	11.4 %	10.6 %	2.7 %
Rough Collie (396)	65.8 %	6.1 %	14.3 %	5.9 %	6.5 %	1.3 %
Rottweiler (3985)	36.6 %	5.0 %	26.3 %	16.7 %	13.3 %	2.2 %

Table 4. Summary of hereditary eye diseases included in the BVA/KC/ISDS scheme. Source BVA/KC/ISDS Tables of Breeds and Conditions Certified Under Schedule 1 and Schedule 3 of Eye Scheme.[25]

Note: 'Primary' denotes that the disease is not the consequence of another disease already affecting the dog (since some of the diseases listed may also occur as a consequence of another disease). 'Congenital' indicates that the condition is present from birth, rather than developing later in life. 'Progressive' denotes that the disease or condition becomes worse over time.

Hereditary eye disease or abnormality	Number of breeds known to be affected or under investigation, as at July 2005	
	Known to be affected	Under Investigation
Collie eye anomaly	5	1
Congenital hereditary cataract	1	3
Central progressive retinal atrophy	9	1
Primary glaucoma	6	7
Generalised progressive retinal atrophy	20	4
Progressive retinal atrophy	1	
Hereditary cataract	20	13
Multifocal retinal dysplasia	7	7
Persistent hyperplastic primary vitreous	2	
Primary lens luxation	8	1
Persistent pupillary membrane	1	8
Total retinal dysplasia	2	
Abnormal pigment deposition		2
Coloboma		1
Multiocular defects		10
Optic nerve hypoplasia		3

GLOSSARY OF KNOWN OR SUSPECTED INHERITED EYE DISEASES INCLUDED IN THE BVA/KC/ISDS SCHEME [25, 43, 44]

Collie Eye Anomaly (CEA):

abnormal development of the eye, which can have only a mild effect on vision but may include severe cases such as retinal detachment and haemorrhage within the eye, leading to blindness. CEA affects Rough and Smooth collies, Shetland Sheep Dogs and the Lancashire Heeler. (CEA only has a low incidence in Border Collies.)The International Sheep Dog Society requires eye testing for all the dogs competing at national sheep dog trials and for the registration of puppies. According to the ISDS, the incidence of Collie eye anomaly in the dogs tested, most of them owned by farmers and shepherds, has remained steady at around 1%. 44 Over 20 years of testing by the ISDS, the incidence of progressive retinal atrophy has decreased from 14% of dogs tested to 1% of dogs tested.44 According to statistics collected by Gough and Thomas in *Breed Predispositions to Disease in Dogs and Cats*, CEA has an overall prevalence of 50% - 90% among collies worldwide.[20]

Congenital hereditary cataract:

any opacity of the lens, present at birth. Affects miniature Schnauzer and is being investigated in Old English Sheepdog, Golden Retriever and West Highland White Terrier.

Hereditary cataract:

cataract not present at birth. Affects large number of breeds including Cavalier King Charles Spaniel, German Shepherd dog, Old English Sheepdog, Golden and Labrador Retriever, Siberian Husky and Standard Poodle, among others. Cataract can also be caused in other breeds by existing other diseases, such as retinal dysplasia, persistent papillary membrane, and multiocular abnormalities.[43]

Central progressive retinal atrophy:

degeneration of the retina, causing vision deficiencies. Does not usually cause blindness. Affects collies, Shetland Sheepdog, Golden and Labrador Retrievers, Cocker and English Springer Spaniels and Welsh Cardigan Corgi.

Primary glaucoma or goniodysgenesis:

Glaucoma results in progressive loss of vision. It is associated with an increase in pressure inside the eye and can be extremely painful to the dog. Goniodysgenesis is an abnormality in eye development, which can predispose to glaucoma. The Basset Hound, Cocker Spaniel, Welsh Springer Spaniel, flat-coated retriever and Siberian Husky are known to be affected, and the disease is being investigated in the Dandie Dinmont Terrier, Golden Retriever, English Springer Spaniel and Great Dane, among others.

Generalised progressive retinal atrophy:

degeneration of the cells of the retina, leading to blindness. Affects a large number of breeds, including the Rough Collie, Dachshund, Irish Setter, Miniature and Toy Poodle, Golden and Labrador Retriever, Cocker Spaniel and Welsh Cardigan Corgi and others. It is being investigated also in the Miniature Smooth-Haired Dachshund, Akita, Papillon and Yorkshire Terrier.

Multifocal retinal dysplasia:

abnormality in retina present at birth. May cause severe visual impairment, although in many cases the effects are not severe. Affects the Cavalier King Charles Spaniel, Rottweiler and Golden Retriever among others. It is being investigated in the Beagle, Rough Collie, Elkhound, German Shepherd Dog, Labrador Retriever, Field Spaniel and Sussex Spaniel.

Persistent hyperplastic primary vitreous:

congenital condition of abnormal development of the vitreous of the eye. Mild cases can allow adequate vision but can cause cataract and blindness. Most frequently occurs in Dobermann and Staffordshire Bull Terrier.[20]

Primary lens luxation:

displacement of the eye lens from normal position. Can lead to glaucoma and usually occurs in both lenses. Affects Terrier breeds and the Border Collie.

Persistent pupillary membrane:

strands of the tissue which cover the eye pupil in the embryo do not disappear in the first weeks after birth as is normal. The condition does not often cause serious visual defects. Affects 50% of the Basenji breed.[43]

Total retinal dysplasia:

the retina detaches and vision is lost. Affects the Bedlington Terrier, Labrador Retriever and Sealyham Terrier.

Abnormal pigment deposition:

Inflammation of the iris and ciliary body can be associated with abnormal pigment deposition. Often associated with iris cysts and can lead to cataract and glaucoma.[20] Affects the Cairn Terrier and Labrador Retriever.

Coloboma.

A congenital absence (hole or gap) of part of an ocular structure, which may affect eyelid, iris, the coating of the eyeball, the lens or optic disc. Affects the Australian Shepherd Dog.

Multiocular defects.

Several congenital defects in the same eye, possibly leading to defective vision. It is being investigated in 10 breeds, including the Rottweiler, Golden Retriever, Old English Sheepdog, Cocker Spaniel and West Highland White Terrier.

Optic nerve hypoplasia.

A congenitally small optic disc (the area where the optic nerve joins the retina) with reduced numbers of optic nerve axons and visual impairment. 3 breeds are under investigation; the Miniature Long-Haired Dachshund, Miniature Poodle and Toy Poodle.

Table 5. Number of dog breeds associated with hereditary eye disease
Source Gelatt, *Essentials of Veterinary Ophthalmology*, 2000.[27]

Breed-related eye disease of abnormality	Number of breeds listed as associated with the disease
Eyelid defects	58
Hereditary glaucoma	20
Cataract	75
Retinal dysplasia including retinal detachment	25
Retinal degeneration	44

Table 6. Breed-related heart and respiratory problems given in Martin and Corcoran, *Cardiorespiratory diseases of the dog and cat*, 1997[28]

	Cardiac problems	*Respiratory problems*
Beagle	pulmonic stenosis	
Bichon Frise		ciliary dyskinesia
Boston Terrier		
Boxer	subaortic stenosis, pulmonic stenosis,dilated cardiomyopathy, pericardial effusion	
Cairn Terrier		pulmonary interstitial fibrosis
Cavalier		
King Charles Spaniel	atrioventricular valve endocardiosis, patent ductus arteriosus	brachycephalic upper airway syndrome
Chihuahua	pulmonic stenosis, atrioventricular valve endocardiosis	
Cocker Spaniel	dilated cardiomyopathy atrioventricular valve endocardiosis, patent ductus arteriosus, pulmonic stenosis	
Doberman Pinscher	dilated cardiomyopathy	
English Bulldog	subaortic stenosis, pulmonic stenosis, Tetralogy of Fallot	hypoplastic trachea,** brachycephalic upper airway syndrome
English Bull Terrier	atrioventricular valve dysplasia, subaortic stenosis	
Fox Terrier	pulmonary stenosis, Atrioventricular valve endocardiosis	
German Shepherd Dog	patent ductus arteriosus, subaortic stenosis, dilated cardiomyopathy, pericardial effusion, atrioventricular valve dysplasia,	

Gordon Setter	atrioventricular valve endocardiosis	ciliary dyskinesia
Great Dane	atrioventricular valve dysplasia, dilated cardiomyopathy,	
Irish Setter	atrioventricular valve dysplasia, dilated cardiomyopathy, patent ductus arteriosus	laryngeal paralysis
Irish Wolfhound	dilated cardiomyopathy	
Keeshond	Tetralogy of Fallot, ventricular septal defect	
Miniature Poodle	patent ductus arteriosus, atrioventricular valve endocardiosis	tracheal collapse
Miniature Schnauzer	sick sinus syndrome	
Newfoundland	subaortic stenosis, dilated cardiomyopathy	
Old English Sheepdog	dilated cardiomyopathy, atrioventricular valve dysplasia, patent ductus arteriosus	
Pekinese	atrioventricular valve endocardiosis	brachycephalic upper airway syndrome
Pomeranian	patent ductus arteriosus	
Pug		brachycephalic upper airway syndrome
Retrievers (Labrador and golden)	atrioventricular valve dysplasia, pericardial effusion	laryngeal paralysis
St Bernard	dilated cardiomyopathy, pericardial effusion	
Samoyed	subaortic stenosis	
Schnauzer	atrioventricular valve endocardiosis, pulmonic stenosis	
Shetland Sheepdog	patent ductus arteriosus	
Springer Spaniel	dilated cardiomyopathy, persistent atrial standstill	ciliary dyskinesia
West Highland White Terrier	pulmonis stenosis	pulmonary interstitial fibrosis
Yorkshire Terrier	atrioventricular valve endocardiosis	tracheal collapse

** The Staffordshire Bull Terrier also suffers from hypoplastic trachea.

Table 7. Relative risk of selected cardiovascular diseases in particular breeds. Source: *Gough and Thomas, Breed Predisposition to Disease in Dogs and Cats*, 2004 [20]

A value greater than 1.0 indicates an increased risk for the breed compared to the general dog population. Hence a value of 5 would indicate a 5-fold increased risk for the breed compared to the general dog population.

Breed	Relative risk of disease for the breed								
	AS	ASD	EC	PDA	PE	PS	SSS	VSD	TofF
Basset								>5	
Bichon Frise				5.5					
Boxer	9.3	25.0			1.5		2.6		
Bulldog	>5					12.9		5.0	
Cavalier King Charles Spaniel			20.1						
Cocker Spaniel			2.0 (NSS)	2.6		1.6 (NSS)	1.7		
Fox Terrier						10.5			22.0
German Shepherd Dog**	2.6				2.3				
Golden Retriever	6.8				7.4				
Labrador Retriever**					2.2				
Pekinese			4.1						
Poodle (Toy)			3.1	6.7					
Poodle (Miniature)			2.8	5.9					
Rottweiler	5.4								
Shetland Sheepdog				3.9					
Shih Tzu			3.3					3.3	
Springer Spaniel				4.0				5.0	
West Highland White Terrier						4.2		13.4	14.1
Yorkshire Terrier			2.6	4.2					

NSS = not statistically significant

AS = aortic stenosis; ASD = atrial septal defect; EC = endocardiosis; PDA = patent ductus arteriosus; PE = pericardial effusion; PS = pulmonic stenosis; SSS = sick sinus syndrome; VSD = ventricular septal defect; TofF = Tetralogy of Fallot.

** In addition, the relative risk of tricuspid dysplasia (a malformation of the tricuspid valve, which can lead to heart failure) is >5 for the Labrador Retriever and 3.1 for the German Shepherd Dog [20]

GLOSSARY OF HEART AND RESPIRATORY DISEASES IN TABLES 6 AND 7: [20]

Pulmonic stenosis:
involves an obstruction of blood flow from the heart; a common congenital condition that may cause congestive heart failure.

Dysplasia:
general term meaning an abnormality of growth, deformity or defect.

Stenosis:
terms meaning an obstruction or abnormal narrowing.

Ciliary dyskinesia:
the mechanism for removing mucus from the airways is deficient, leading to respiratory infections.

Atrioventricular valve endocardiosis:
chronic degenerative valvular disease, the most common cause of heart disease in dogs.[20]

Subaortic stenosis:
a congenital heart defect that can lead to collapse and sudden death.

Aortic stenosis:
A condition involving obstructing of blood flow and circulation, which may be due to congenital malformation of the heart valves or other obstruction. According to Gough and Thomas, this disease accounts for one third of reported cases of congenital heart disease in dogs and 'Dogs with aortic stenosis should not be used for breeding.'[20]

Dilated cardiomyopathy:
a heart condition involving thin heart walls and reduced power of heartbeat. About 6.5 per thousand purebred dogs have this condition, compared to 1.6 per thousand mixed breed dogs[20], a 4-fold increased risk for purebreds.

Percardial effusions:
a build-up of fluid around the heart, tending to affect large or giant dogs, which can lead to weakness or to collapse or death.

Pulmonary interstitial fibrosis:
scarring and fibrous tissue in lung tissue, causing cough and exercise intolerance.

Patent ductus arteriosus:
the ductus arteriosus fails to close after birth; one of the commonest congenital heart problems in dogs.[20]

Brachycephalic upper airway syndrome:
a complex group of anatomical deformities affecting several (brachycephalic) breeds which results in varying degrees of upper airway obstruction.

Tetralogy of Fallot:
a congenital condition involving 4 heart abnormalities at the same time.

Hypoplastic trachea:
the trachea fails to develop fully; this is part of brachycephalic upper airway syndrome.

Sick sinus syndrome:
a disturbance of heart rhythm leading to fainting.

Persistent atrial standstill:
enlargement and thinning of the atria (upper chambers of the heart).

Table 8. Examples of breed-related skin diseases given in Hill, Small animal dermatology. A practical guide to the diagnosis and management of skin diseases in dogs and cats, 2002 [30]

Breed	*Skin diseases for which the breed has predilection*
Basset Hound	Atopic dermatitis, *Malassezia* dermatitis, intertrigo
Boston Terrier	Demodicosis, intertrigo, hyperadrenocorticism
Boxer	Atopic dermatitis, demodicosis, flank alopecia, hyperadrenocorticism, hypothyroidism, chin furunculosis, interdigital furunculosis
Bulldog	Atopic dermatitis, demodicosis, intertrigo, staphylococcal folliculitis, interdigital furunculosis, chin furunculosis, hypothyroidism, *Malassezia* dermatitis
Cavalier King Charles Spaniel	Primary seborrhoea, syringohydromyelia (Arnold -Chiari syndrome)
Cocker Spaniel	Atopic dermatitis, hypothyroidism, lip fold intertrigo, *Malassezia* dermatitis, otitis externa, primary seborrhoea
Collie	Dermatomyositis, cutaneous lupus, pemphigus erythematosus
Dachshund	Alopecia areata, demodicosis, colour dilution alopecia, staphyococcal folliculitis, hypothyroidism, hyperadrenocorticism, *Malassezia* dermatitis, sterile nodular panniculitis, pattern baldness
Dalmatian	Atopic dermatitis, demodicosis, staphylococcal folliculitis
Doberman Pinscher	Acral lick dermatitis, colour dilution alopecia, demodicosis, flank alopecia, hypothyroidism, chin furunculosis, vitiligo, primary seborrhoea
German Shepherd Dog (GSD)	Atopic dermatitis, GSD pyoderma, nasal planum lupus, lupoid onychodystrophy, metatarsal fistulae, mucocutaneous pyoderma, vitiligo
Gold Retriever	Acral lick dermatitis, acute moist dermatitis, atopic dermatitis, staphylococcal folliculitis, hypothyroidism, juvenile cellulitis, nasal depigmentation
Jack Russell Terrier	Atopic dermatitis, demoicosis, dermatophytosis (Trichophyton erinacei), vasculitis
Labrador Retriever	Acral lick dermatitis, acute moist dermatitis, atopic dermatitis, nasal hyperkeratosis, staphylococcal folliculitis and furunculosis, *Malassezia* dermatitis
Old English Sheepdog	Atopic dermatitis, demodicosis, interdigital furunculosis
Pekinese	Intertrigo
Persian Cat	Cheyletiellosis, dermatophytosis, intertrigo, matted fur, idiopathic facial dermatosis
Poodle	Epiphoral staining, hyperadrenocorticism, hypothyroidism, sebaceous adenitis (standard poodle)
Pug	Atopic dermatitis, intertrigo (skin fold dermatitis)
Rottweiler	Staphylococcal folliculitis and furunculosis, vitiligo
Shar Pei	Atopic dermatitis, demodicosis, intertrigo, staphylococcal folliculitis, hypothyroidism, mucinosis
Shetland Sheepdog	Dermatomyositis, lupus, staphylococcal folliculitis
Springer Spaniel	Hypothyroidism, lip fold intertrigo, *Malassezia* dermatitis, otitis externa, primary seborrhoea
St Bernard	Acral lick dermatitis, staphylococcal folliculitis and furunculosis, acute moist dermatitis, lip fold intertrigo
W Highland White Terrier	Atopic dermatitis, demodicosis, *Malassezzia* dermatitis, primary seborrhoea
Yorkshire Terrier	Atopic dermatitis, colour dilution alopecia

Glossary of skin disorders listed in Table 8:[20]

Atopic dermatitis:
skin inflammation caused by allergies, which can lead to itching, self-trauma and bacterial infection.

***Malassezia* dermatitis;**
infection by a yeast (*Malassezia*) organism causing itchy, greasy and scaly skin.
Intertrigo: inflammation and bacterial infection caused by two surfaces (such as skin folds) rubbing together.

Demodicosis:
a severe skin disease caused by the *Demodex* mite.

Hyperadrenocorticism (Cushing's syndrome)
An overproduction of corticosteroids, sone of the results of which can be skin eruptions and baldness.

Hypothyroidism:
a deficiency in thyroid hormone production, most common in Dobermann pinscher and Golden Retriever,[20] which can lead to hair loss and skin irritation. 00

Furunculosis:
the presence of abscesses or cysts; interdigital furunculosis: abscesses between the toes.

Staphylococcal folliculitis:
inflammation of hair follicles as a result of infection by Staphylococcus bacteria.

Otitis externa:
inflammation of the ear.

Syringohydromelia (Arnold-Chiari syndrome):
a disorder of the spinal cord near the brain, causing persistent scratching probably because of pain in the head and neck area; affects Cavalier King Charles Spaniels.

Primary seborrhoea:
an inherited disorder of excessive oil production by the skin, which results in flaking, scaling, crusting and greasy, smelly skin, and often leads to bacterial and fungal infection.

Dermatomyositis:
inflammation of the skin (and sometimes muscles) of Shetland sheepdogs and collies, sometimes with ulceration; may be an immune system disorder.

Cutaneous lupus/nasal planum lupus:
an immune system disease that causes inflammation and lesions of the skin.

Pemphigus erythematosus:
autoimmune disease causing redness and pustular and crusty erosions on face and ears. (affects collies, German shepherd dog and German shepherd crosses).

Alopecia:
hair loss; alopecia areata is a disease causing hair loss without inflammation.

Lupoid onychodystrophy:
disease of the claws, causing pain and claw loss.

Pyoderma:
a pustular skin disease.

Pituitary dwarfism:
most commonly occurs in German Shepherd Dog and results in hair and skin abnormalities.

Sterile nodular panniculitis:
an autoimmune disease involving inflammation of subcutaneous fat and nodules that burst.

Mucocutaneous pyoderma:
bacterial infection causing swelling, crusting, itching and possibly ulcerated areas on lips, nostrils and other areas where skin joins mucous membranes. German Shepherd Dogs are believed to be predisposed.

Vitiligo:
autoimmune disease causing loss of pigment on the face.

Acral lick dermatitis:
a behavioural problem involving self-licking and self-chewing, which can lead to skin erosion and ulceration. Large breeds appear to be predisposed (such as Doberman, Great Dane, Retrievers, German Shepherd dog).

Juvenile cellulitus:
Swelling and ulceration around face and ears and enlarged lymph glands. May be known as 'puppy strangles' as swellings may prevent the puppy from breathing.

Nasal hyperkeratosis:
thickened skin growths on the nose.

Dermatophytosis:
ringworm, a fungal skin disease.

Cheyletiellosis:
itchy skin disease caused by mites.

Idiopathic facial dermatosis:
in Persian cats, causes redness, scratching and crusting of skin of head and neck.

Epiphora:
disorder in which tears run over the cheeks instead of into tear ducts.

Sebaceous adenitis:
inflammation of sebaceous glands causes dry, scaly skin, hair loss and skin odour in standard poodles and other long-haired breeds.

Mucinosis:
a build-up of fluid (mucin) under the skin, in the Shar Pei.

Table 9. Proportion of deaf dogs in some breeds in which congenital deafness has been studied. Source: J L N Wood, Deafness – the disease and the research, in Hereditary Diseases in Dogs, 1997 [36]

Breed	*Totally deaf (both ears)*	*Deaf in one ear only*
Dalmatian (USA)	8.0 %	21.8%
Dalmatian (UK)	7.4%	14.0%
Border Collie	2.8%	2.3%
English Setter (USA)	2.4%	12.7%
English Cocker Spaniel (USA)	1.8%	7.0%
Bull Terrier (USA) - white	1.5%	17.5%
Bull Terrier (USA) - coloured	0.0%	2.1%

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The Price of a Pedigree

DOG BREED STANDARDS AND BREED-RELATED ILLNESS

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