THE KENNEL CLUB
DOG HEALTH

Breed Health and Conservation Plan

Deerhound

2018

BHCP/Version 1/July 2018

INTRODUCTION

The Kennel Club launched a dynamic new resource for breed clubs and individual breeders – the Breed Health and Conservation Plans (BHCP) project – in September 2016. The purpose of the project is to ensure that all health concerns for a breed are identified through evidence-based criteria, and that breeders are provided with useful information and resources to support them in making balanced breeding decisions that make health a priority.

The Breed Health and Conservation Plans take a holistic view of breed health with consideration to the following issues: known inherited conditions, complex conditions (i.e. those involving many genes and environmental effects such as nutrition or exercise levels, for example hip dysplasia), conformational concerns and population genetics.

Sources of evidence and data have been collated into an evidence base (Section 1 of the BHCP) which gives clear indications of the most significant health conditions in each breed, in terms of prevalence and impact. Once the evidence base document has been produced it is discussed with the relevant Breed Health Coordinator and breed health committee or representatives if applicable. Priorities are agreed and laid out in Section 2. A collaborative action plan for the health of the breed is then agreed and incorporated as Section 3 of the BHCP. This will be monitored and reviewed.

SECTION 1: EVIDENCE BASE

Demographics

The Deerhound is a vulnerable native breed, defined as a breed with fewer than 300 new registrations a year. The numbers of new registrations of the breed have been consistently below this threshold since 2010, but have been relatively stable since this time, as shown in Table 1 below.

Table 1: Number of Deerhounds registered per year between 2007 and 2017.

Year	Number of new registered Deerhounds	Percentage of Deerhounds in the KC registered population per year
2007	327	0.12%
2008	309	0.11%
2009	324	0.13%
2010	256	0.10%
2011	237	0.10%
2012	260	0.11%
2013	236	0.11%
2014	234	0.11%
2015	267	0.12%
2016	209	0.09%
2017	271	0.11%

The number of Deerhounds registered by year of birth between 1980 and 2017 are shown in Figure 1. The 1980 registrations figure appears depressed for all breeds due to registrations moving across to the electronic system from paper files. The trend of registrations over year of birth (1980-2014) was +3.05 per year (with a 95% confidence interval of +1.60 to +4.51), reflecting the slight overall increase in registrations. [Put simply, 95% confidence intervals (C.I.s) indicate that we are 95% confident that the true estimate of a parameter lies between the lower and upper number stated.]

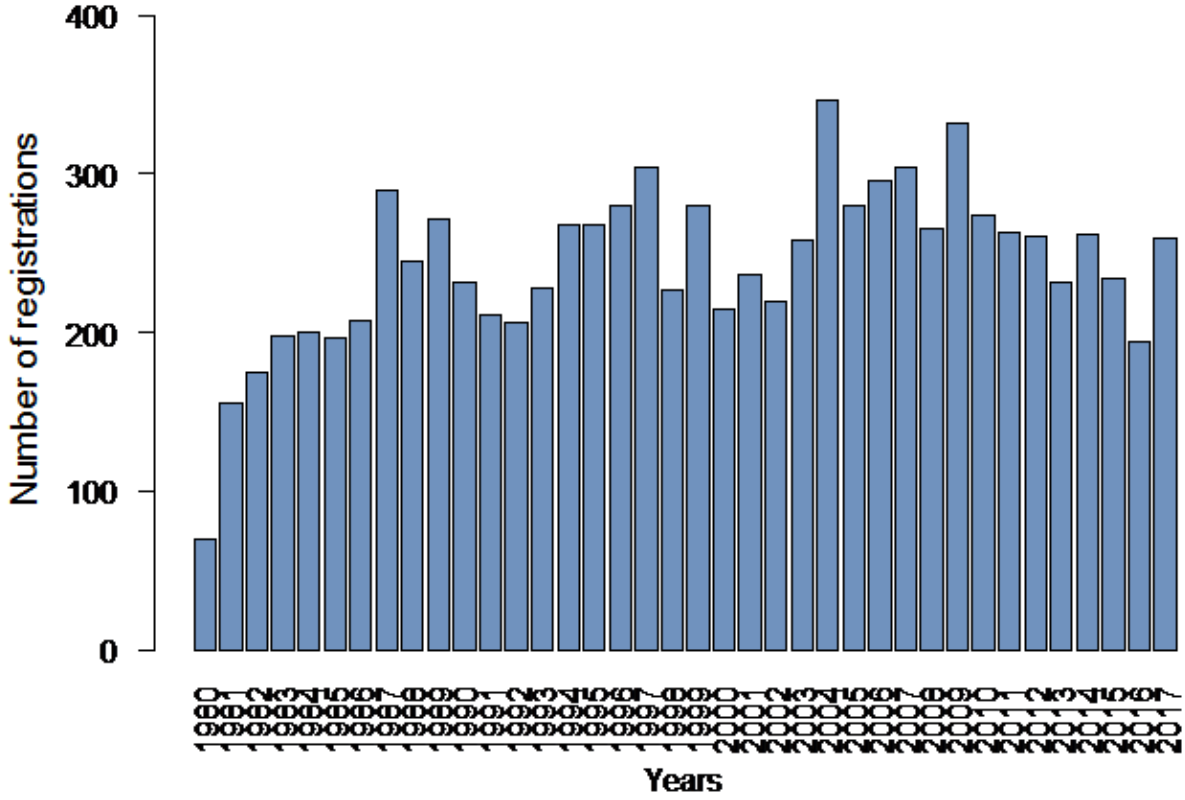

Figure 1: Number of registrations of Deerhounds per year of birth, 1980 – 2017

Literature review

The literature review lays out the current scientific knowledge relating to the health of the breed. We have attempted to refer primarily to research which has been published in peer-reviewed scientific journals. We have also attempted to acknowledge possible limitations of the studies reported, including when the research involved dogs in other countries. Whilst there are often strong links between populations of a breed in different countries, there are also often differences between the populations and issues seen in one country may not be seen (or may have a different prevalence) in another. However, it may also be useful for United Kingdom (UK) breeders to be aware of conditions occurring in the breed in other countries which have not yet been seen in the UK population, especially given that movement of breeding stock does occur between countries.

It is worth taking into account that, although there are not large numbers of published studies involving the Deerhound and some of those found have a small sample size and a small number of the breed represented, this breed makes up a numerically very small percentage of the overall dog population. For example, in 2017 out of 243,290 Kennel Club registrations only 271 (0.11%) of these registrations were Deerhounds.

Cardiovascular conditions

Dilated cardiomyopathy (DCM): In a study of 369 dogs referred to the Veterinary Cardiorespiratory Centre in Kenilworth, England, between January 1993 and May 2006, Martin et al (2009) reported that the Deerhound was ranked the thirteenth most commonly affected breed with six dogs of the breed in the study population. No prevalence estimates could be found in the peer-reviewed literature.

Dermatological conditions

No scientific references to conditions in this category could be found for the breed.

Endocrine conditions

No scientific references to conditions in this category could be found for the breed.

Gastrointestinal conditions

Gastric dilatation-volvulus syndrome (GDV, bloat): GDV is an acute, life-threatening condition featuring rapid accumulation of air in the stomach, malposition of the stomach to a varying degree and a rise in intragastric pressure, frequently leading to the development of cardiogenic shock (Glickman et al, 2000). In an analysis of data collected in the 2004 Purebred Dog Health Survey, 7.0% (20 of 287) Deerhounds were reported to have died due to GDV giving a prevalence ratio of 3.0 (95% C. I. 2.0 – 4.6); this represented an increased risk of death due to the condition than dogs of other breeds (Evans et al, 2010).

Haematological conditions

No scientific references to conditions in this category could be found for the breed.

Hepatic conditions

Portosystemic shunt (PSS): PSS is a condition involving abnormal vascular connections allowing blood to bypass the liver, leading to poor growth and neurological and gastrointestinal signs. It has been stated that high incidence of congenital PSS has been observed in Deerhounds in the UK, although figures were not provided to support this (Maxwell et al, 2000). A whole litter screening scheme was instituted in an attempt to reduce the incidence of the condition in the breed, using measurement of postprandial bile acid levels.

Immunological conditions

No scientific references to conditions in this category could be found for the breed.

Musculoskeletal conditions

Osteoarthritis of cervical articular facet joints: Osteoarthritis of the articular facet joints of the cervical vertebrae has been reported by German authors to be particularly common in male Deerhounds. The medical records of all Deerhounds examined at the Department of Laboratory Animal Science in the University Hospital of Aachen between 1998 and 2002 were reviewed; 14 Deerhounds were seen during this time period, and nine were round to have cervical articular facet joint osteoarthritis (Kinzel et al, 2003). The condition was not diagnosed in any dogs of other breeds at the clinic over this time period. No more recent reports, nor prevalence estimates, for the condition could be found in the literature.

Osteochondrodysplasia: A form of skeletal dysplasia leading to dwarfism, exercise intolerance, kyphosis (excessive convex curvature of the spine), limb deformities and joint laxity was described in five related Deerhound puppies from two litters in America (Breur et al, 1989). A single gene, autosomal recessive mode of inheritance was suspected. No more recent reports or prevalence estimates could be found in the literature.

Neoplastic conditions

Osteosarcoma: In an American study of 1,057 dogs of the breed, reported to represent approximately 21% of all American Kennel Club registered Deerhounds between the years 1975 and 2003, the prevalence of this malignant bone tumour amongst all individuals with known health status was 21% (211 out of 1005) and the heritability was high at 0.69 (Phillips et al, 2007). Age and gender appeared to be correlated with development of the condition, with older, female dogs being more frequently affected, whilst height, weight and age at neutering appeared not to be correlated with the condition. Pedigree analysis, using two lines of Deerhounds of known osteosarcoma status in America, suggested that there may be at least two different genetic risk factors for osteosarcoma in the breed with differing inheritance patterns (Dillberger and McAtee, 2017).

Neurological conditions

No scientific references to conditions in this category could be found for the breed.

Ocular conditions

No scientific references to conditions in this category could be found for the breed.

Reproductive conditions

No scientific references to conditions in this category could be found for the breed.

Respiratory conditions

No scientific references to conditions in this category could be found for the breed.

Urological conditions

Urolithiasis – cystine: A possible breed predisposition to cystine uroliths was reported in a study of 16,647 uroliths submitted to the Canadian Veterinary Urolith Centre between 1998 and 2003, with three of 59 cystine uroliths occurring in male Deerhounds (Houston et al, 2004). However no prevalence estimates could be found in the literature.

Purebred/pedigree dog health survey results

2004 Morbidity results: Health information was collected for 442 live Deerhounds of which 300 (68%) were healthy and 142 (32%) had at least one reported health condition. The top categories of diagnosis were reproductive (17.5%, 40 of 229 reported conditions), musculoskeletal (14.8%, 34 of 229 reported conditions), gastrointestinal (13.1%, 30 of 229 reported conditions) and dermatologic (10.0%, 23 of 229 reported conditions). The most frequently reported specific conditions were pyometra (4.4% prevalence, 12 cases in the 275 female Deerhounds in the survey), GDV (2.9% prevalence, 13 cases), arthritis (2.9% prevalence, 13 cases), undiagnosed skin irritation (2.5%, 11 cases) and kennel cough (2.3% prevalence, 10 cases).

2004 Mortality results: A total of 287 deaths were reported for the breed. The median age at death for Deerhounds was 8 years and 8 months (min = 2 months, max = 16 years and 9 months). The most frequently reported causes of death by organ system or category were cardiac (24.4%, 70 of 287 deaths), cancer (18.8%, 54 deaths), old age (12.2%, 35 deaths) and gastrointestinal (8.7%, 25 deaths). The most frequent specific causes of death, apart from cancer and old age, were heart failure (10.5%, 30 deaths), DCM or cardiomyopathy unspecified (8.4%, 24 deaths) and GDV (7.0%, 20 deaths).

2014 Morbidity results: Health information was collected for 87 live Deerhounds of which 60 (69%) were healthy and 27 (31%) had at least one reported health condition. The most frequently reported specific conditions were lipoma (4.6% prevalence, 4 cases), skin (4.6% prevalence, 4 cases), bone cancer/tumour (2.3% prevalence, 2 cases), dermatitis (2.3% prevalence, 2 cases) and heart failure (2.3% prevalence, 2 cases).

2014 Mortality results: A total of 20 deaths were reported for the breed. The range of reported age at death for Deerhounds was 0 to 16 years. The most frequently reported causes of death were cardiac failure, cardiomyopathy, bone tumour, aggression and arthritis.

VetCompass results

No VetCompass data were currently available for the Deerhound.

Insurance data

UK Agria data

Insurance data were available for Deerhounds insured with Agria UK. 'Exposures' are equivalent to one full policy year; in 2016 there were 143 free exposures, 135 full exposures and 146 claims, in 2017 these figures were 179, 125 and 199 respectively. Full policies are available to dogs of any age. Free policies are available to breeders of Kennel Club registered puppies and cover starts from the time the puppy is collected by the new owner; cover under free policies lasts for five weeks from this time. It is possible that one dog could have more than one settlement for a condition within the 12-month period shown. The top 10 conditions by number of settlements, for authorised claims where treatments started between 1st October 2016 and 31st September 2017, are shown in Table 3 below.

Table 3: Top 10 conditions and number of settlements for each condition between 1st October 2016 and 31st September 2017 for Deerhounds insured with Agria UK

Condition	Number of settlements
Cardiomyopathy	38
Meningitis	15
Osteoarthritis/degenerative joint disease	11
Spinal pain (not specified)	7
Lameness	6
Acute gastroenteritis	6
Acute pancreatitis	6
Cut to skin	6
Medial patella luxation	5
Laryngeal paralysis	5

Swedish Agria data

Swedish morbidity, but not mortality, insurance data were available from Agria for the Deerhound. Rates are based on dog-years-at-risk (DYAR) which take into account the actual time each dog was insured during the period (2006-2011). The number of DYAR for the Deerhound in Sweden during this period was less than 200, so these results should be interpreted with caution.

The most common specific causes of veterinary care episodes (VCEs) for Agria-insured Deerhounds in Sweden between 2006 and 2011 are shown in Figure 2. The top specific causes of VCEs were skin trauma, cardiomyopathy / endocardiosis, pyometra/endometritis, tracheitis / bronchitis / pneumonia and infection or inflammation of the lower respiratory tract.

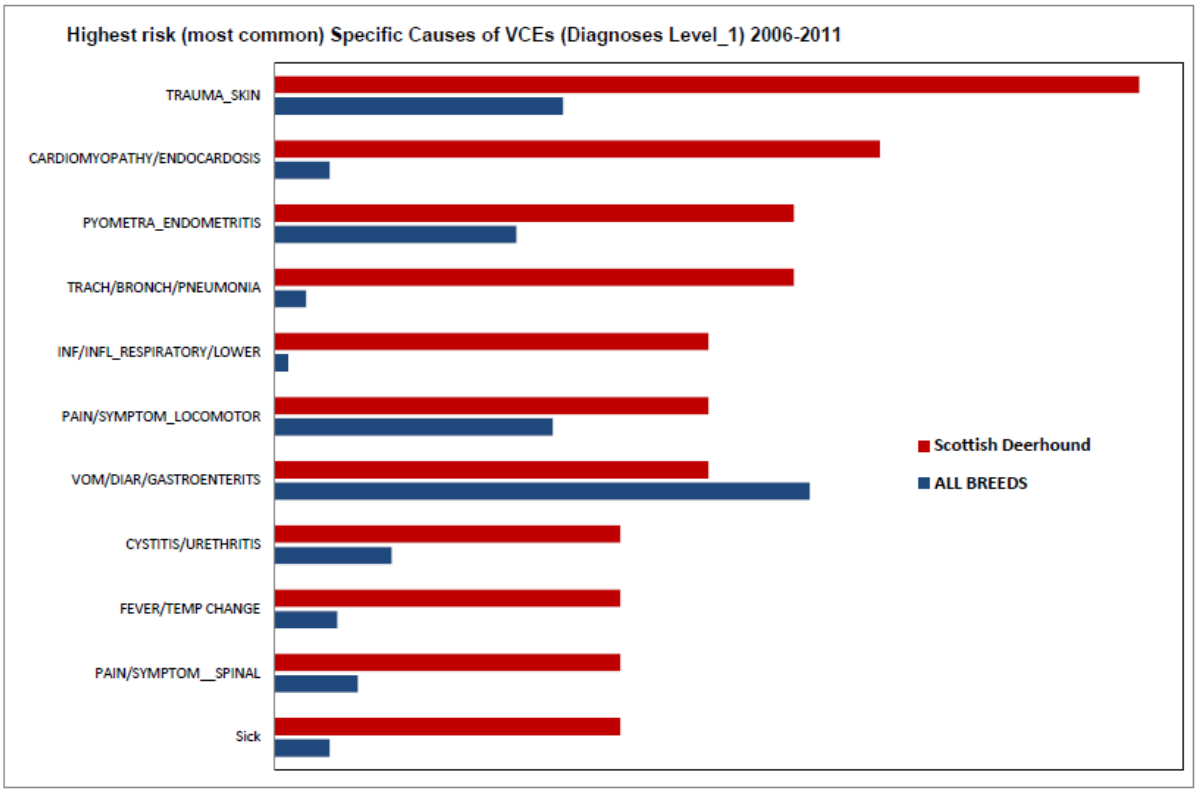

Figure 2: The most common specific causes of VCEs for the Deerhound compared to all breeds in Sweden between 2006 and 2011, from Swedish Agria insurance data.

Breed-specific health surveys

Scottish Deerhound Health Survey 1996

The Scottish Deerhound Club of America undertook a health survey in 1996, in which information was collected on more than 450 American dogs of the breed. Reported findings included that osteosarcoma was the leading cause of death for Deerhound bitches, but a rare cause of death in males; heart failure was the leading cause of death for male Deerhounds. Anal sac infections, fractures and lameness and bloat were the most frequently reported health conditions affecting Deerhounds which were still living at the time of the survey. Full survey analysis can be found here: https://sdcahealth.files.wordpress.com/2016/05/1996-health-survey.pdf

Scottish Deerhound Health Survey 2011

The Scottish Deerhound Club of America undertook a second health survey in 2011, in which information was collected on 588 American dogs of the breed. Osteosarcoma was reported as the cause of death for 22% of Deerhound bitches and 16% of males; heart failure due to cardiomyopathy was the reported cause of death for 8% of bitches and 15% of males. The most frequently reported health conditions affecting male Deerhounds which were still living at the time of the survey were cardiomyopathy, bone tumours and head or neck pain; in females the most frequently reported conditions were bone tumours, cardiomyopathy and torsion of the stomach or spleen. Full analysis of the survey, in three parts, can be found here: https://sdcahealth.wordpress.com/category/health-survey-results/

Deerhound Mortality Survey

The Breed Health Coordinator (BHC) has been running a rolling mortality survey since January 2004. Owners are requested to complete a paper form detailing registered name, sex, date of birth, date of death and cause of death and submit it to the BHC in confidence. Preliminary analysis of reports received between 2004 and 2014 was published in the Deerhound Newsletter in 2015. The deaths of 286 hounds were reported over this time period; the most frequently reported causes of death are shown in Table 4 below.

Table 4: Most frequently reported causes of death, 2000 – 2004, in the ongoing Deerhound Mortality Survey.

Condition	Number of deaths	Percentage
Cardiac (other)	39	14%
DCM	36	13%
Osteosarcoma	23	8%
Other malignant cancers (not bone)	23	8%
Gastric or splenic torsion	23	8%

Questionnaire study investigating congenital portosystemic shunts in Deerhounds

A questionnaire study investigating congenital portosystemic shunts (cPSS) in Deerhounds was undertaken by a Cambridge veterinary student, Lydia Kerridge, in 2014 under the supervision of Dr. Penny Watson. Usable responses were gathered relating to 112 bitches, of which 53 were from the UK, 49 from the USA and 10 other responses came from five different countries. Shunts were reported in six puppies in the UK, two puppies in the USA and one puppy in The Netherlands; this gave an overall prevalence of cPSS of 0.8%, a UK prevalence of 1.1% and an American prevalence of 0.4%. Full analysis of the study can be found here: http://www.deerhound.co.uk/Health%20Matters/Deerhound%20cPSS%20elective%20Lydia%20Kerridge.pdf

Questionnaire study of the prevalence of DCM and sudden death in Deerhounds

A questionnaire study investigating the prevalence of DCM and sudden death in Deerhounds was undertaken by a Liverpool veterinary student, Natalie Heathcote, in 2018 under the supervision of Professor Jo Dukes-McEwan and Emily Dutton. Information was received relating to 1,332 Deerhounds (768 from the UK), of which 416 were still alive at the time of the survey and 916 were deceased. In total, 111 Deerhounds in the study had a confirmed diagnosis of DCM and 58 sudden and unexpected deaths without a prior diagnosis of DCM were reported. The prevalence of DCM across all 1,322 Deerhounds in the survey was 8.33%; 18 of 30 Deerhounds that died naturally from DCM-related causes died suddenly and unexpectedly. The prevalence of sudden death without a previous diagnosis of DCM was 6.33% in the population of 916 deceased Deerhounds in the survey.

Visual health check reports/clinical reports/judges' health monitoring

The Deerhound is currently listed as a category 1 breed on Breed Watch, meaning there are currently no listed visible points of concern for judges to report on. There have been no optional reports from judges for the breed since Breed Watch began.

Breed Club health activities

The Deerhound Club's website has a dedicated breed health section, with relevant articles and resources, including information on portosystemic shunt, Animal Health Trust / University of Nottingham study participation forms and information from previous seminars (including the KC Breeder Education seminars and a University of Nottingham breeder forum held in 2016).

BHC annual report

The 2017 Breed Health Coordinator's Annual Health Report yielded the following response to 'please list and rank the three health and welfare conditions that the breed considers to be currently the most important to deal with in your breed': 1 dilated cardiomyopathy, 2 osteosarcoma, 3 gastric dilatation volvulus. In terms of what the breed has done in the last year to help tackle these listed health and welfare concerns, the breed has been participating in a study aiming to establish echocardiographic dimensions in the breed and a genetic study investigating DCM in conjunction with the University of Nottingham, promoted an owner/breeder questionnaire on attitudes towards treatment of osteosarcoma and promoting the collection of tissue/DNA samples from affected dogs, and are promoting an owner questionnaire identifying factors associated with the development of GDV in the breed.

DNA test results

There are currently no DNA tests recognised by the Kennel Club for the Deerhound. DNA test results are only recorded for Official Kennel Club DNA Testing Schemes which involve collaboration between the Kennel Club, the breed clubs and the DNA testing facilities. DNA tests available for the breed but not currently recorded by the Kennel Club include: a test for Von Willebrand's Disease Type 1 available from Genomia and a test for Factor VII deficiency offered through the AHT, Animal DNA Diagnostics, Animal Genetics, Davis Vet Genetics Lab (University of California), Genomia, Genoscoper (MyDogDNA), Laboklin, Paw Print Genetics, PennGenn, Pinmoore Animal Lab Services and VetGen.

Canine Health Scheme results and EBVs

There are not currently any official health screening schemes required or recommended for this breed within the Kennel Club Assured Breeder Scheme. However, all the British Veterinary Association (BVA)/Kennel Club (KC) Canine Health Schemes are open to dogs of any breed.

HIPS

Just one Deerhound has gone through the British Veterinary Association (BVA)/Kennel Club (KC) Hip Dysplasia Scheme in the 15 years to the end of 2017, and received a score of zero.

ELBOWS

No Deerhounds have been elbow scored as part of the BVA/KC Elbow Dysplasia Scheme since the scheme launched in 1998.

EYES

The breed is not currently on Schedule A or B for any condition under the BVA/KC/International Sheep Dog Society (ISDS) Eye Scheme. Schedule A lists the known inherited eye conditions in the breeds where there is enough scientific information to show that the condition is inherited in the breed, often including the actual mode of inheritance and in some cases even a DNA test. Schedule B lists those breeds in which the conditions are, at this stage, only suspected of being inherited. However, the BVA still records the results of dogs of other breeds which have participated in the scheme. No dogs of this breed have been tested under the BVA/KC/ISDS scheme in the last 10 years.

Breed Club Recommendations

Litters to be screened for liver shunt prior to being sold.

Reported caesarean sections

When breeders register a litter of puppies, they are asked to indicate whether the litter was delivered (in whole or in part) by caesarean section. In addition, veterinary surgeons are asked to report caesarean sections they perform on Kennel Club registered bitches. The consent of the Kennel Club registered dog owner releases the veterinary surgeon from the professional obligation to maintain confidentiality (vide the Kennel Club General Code of Ethics (2)). There are some caveats to the associated data; it is doubtful that all caesarean sections are reported, so the number reported each year may not represent the true proportion of caesarean sections undertaken in each breed. In addition, these data do not indicate whether the caesarean sections were emergency or elective. The number of litters registered per year for the breed and the number and percentage of reported caesarean sections in the breed for the past 10 years are shown in Table 5.

Table 5: Number and percentage of litters of breed registered per year and number of caesarean sections reported per year, 2008 to 2017.

Year	Number of Litters Registered	Number of C-sections	Percentage of C-sections
2007	44	0	0.00%
2008	39	0	0.00%
2009	49	0	0.00%
2010	38	1	2.63%
2011	37	1	2.70%
2012	39	10	25.64%
2013	37	7	18.92%
2014	40	6	15.00%
2015	35	6	17.14%
2016	33	8	24.24%
2017	37	5	13.51%

Genetic diversity measures

The effective population size is the number of breeding animals in an idealised, hypothetical population that would be expected to show the same rate of loss of genetic diversity (rate of inbreeding) as the population in question; it can be thought of as the size of the 'gene pool' of the breed. In the population analysis undertaken by the Kennel Club in 2015, an estimated effective population size of 60.0 was reported (estimated using the rate of inbreeding over the period 1980-2014). An effective population size of less than 100 (inbreeding rate of 0.50% per generation) leads to a dramatic increase in the rate of loss of genetic diversity in a breed/population (Food & Agriculture Organisation of the United Nations, "Monitoring animal genetic resources and criteria for prioritization of breeds", 1992).

Annual mean observed inbreeding coefficient (showing loss of genetic diversity) and mean expected inbreeding coefficient (from simulated 'random mating') over the period 1980-2014 are shown in Figure 3. As with most breeds, the rate of inbreeding was at its highest in this breed in the 1980s and 1990s. This represents a 'genetic bottleneck', with genetic variation lost from the population. However, since the turn of the century the rate of inbreeding has decreased, implying a slowdown in the rate of loss of genetic diversity (possibly through the use of imported animals) to more sustainable levels. For full interpretation see Lewis et al, 2015 https://cgejournal.biomedcentral.com/articles/10.1186/s40575-015-0027-4.

The current annual breed average inbreeding coefficient is 13.3%. This value is calculated each June and represents the average inbreeding coefficient of all dogs of the breed registered between January and December of the previous year i.e. in 2016.

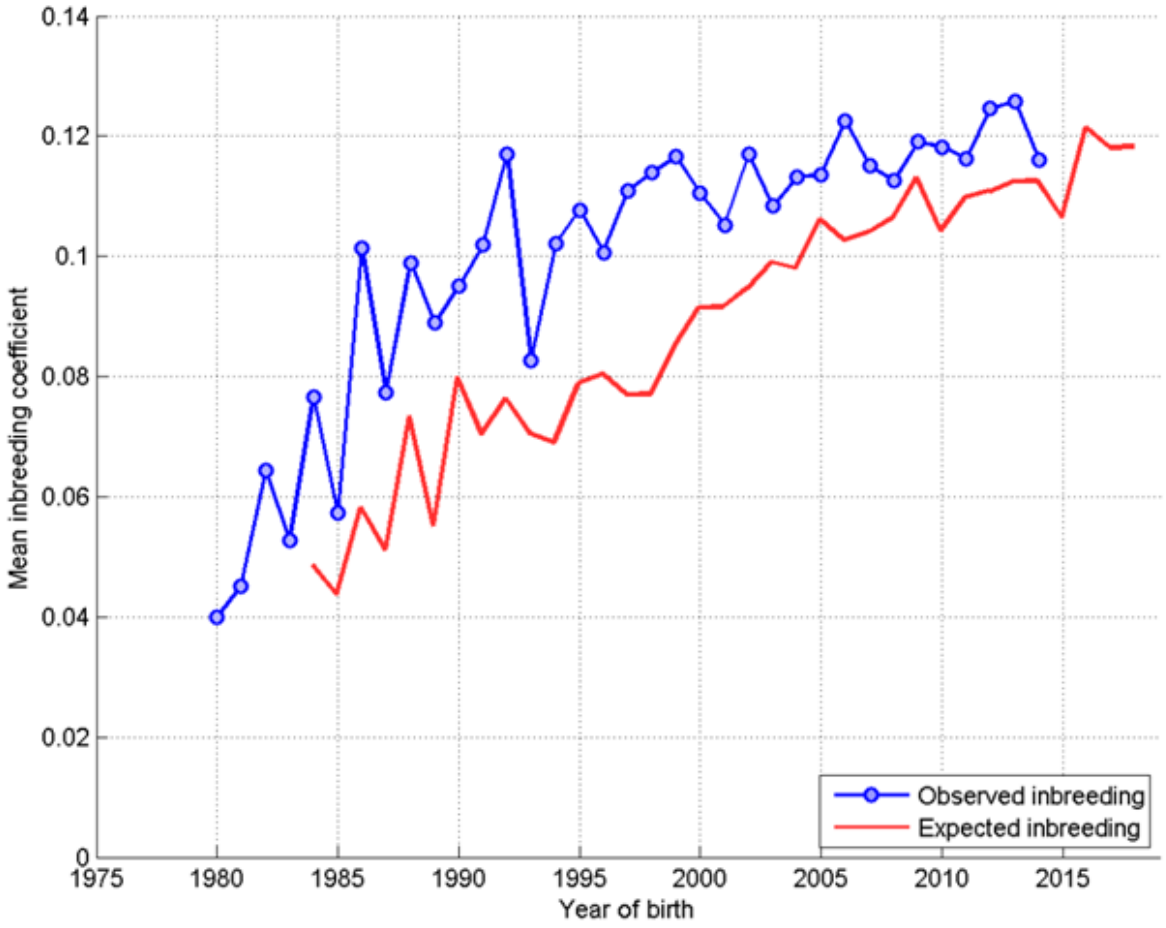

Figure 3: Annual mean observed and expected inbreeding coefficients.

Below is a histogram (‘tally’ distribution) of number of progeny per sire and dam over each of seven five-year blocks (Figure 4). A longer ‘tail’ on the distribution of progeny per sire is indicative of ‘popular sires’ (few sires with a very large number of offspring, known to be a major contributor to a high rate of inbreeding). There appears to be extensive use of popular dogs as sires in this breed (the ‘tail’ of the blue distribution in Figure 4).

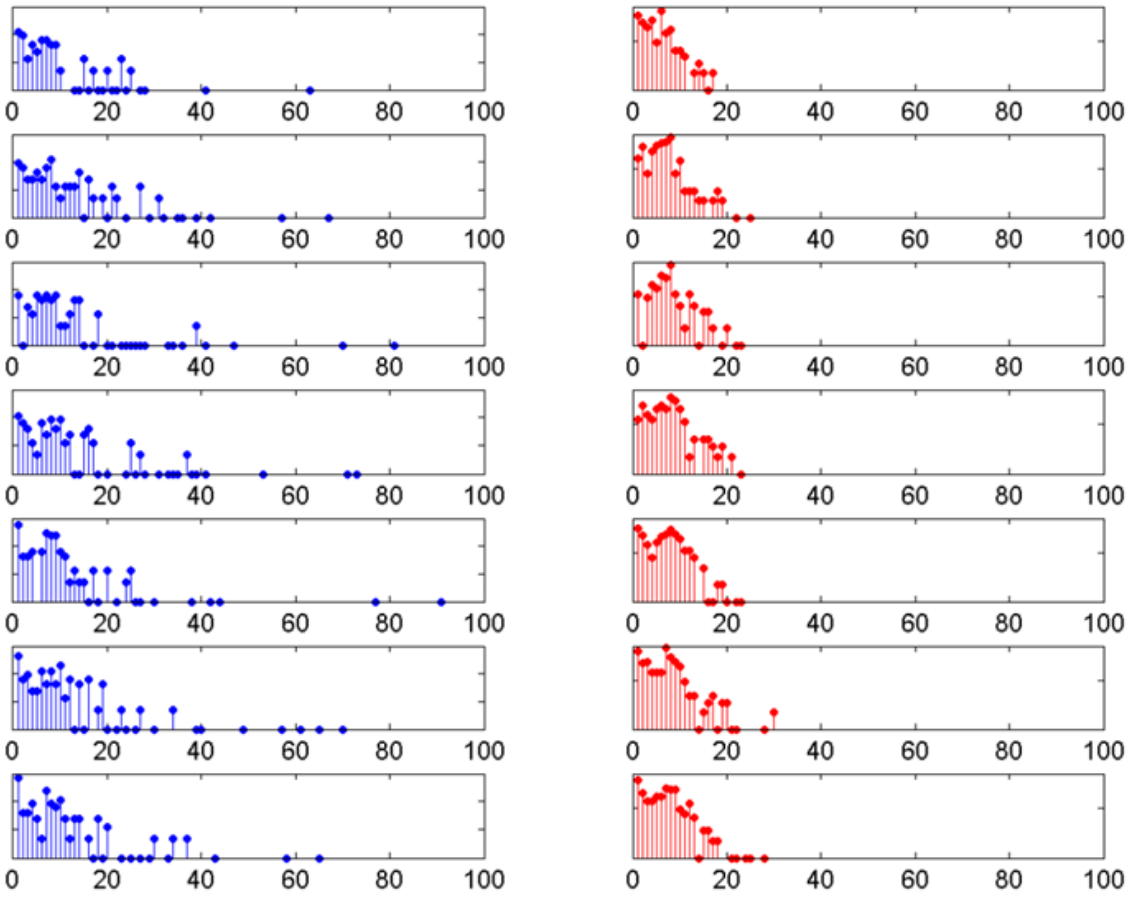

Figure 4: Distribution of progeny per sire (blue) and per dam (red) over 5-year blocks (1980-4 top, 2010-14 bottom). Vertical axis is a logarithmic scale.

Current research projects

The Deerhound Club is collaborating with Emily Dutton, Royal College of Veterinary Surgeons Recognised Specialist in Veterinary Cardiology on a prospective longitudinal heart study to identify the 'normal' range of electrocardiographic measurements in the Deerhound. In total 88 hounds (38 male and 50 female) had been scanned by September 2017. Funding has been secured from the Kennel Club Charitable Trust to enable further measurements including Holter monitoring.

The Deerhound Club is collaborating with Capital Diagnostics on a portosystemic shunt (PSS) project, to investigate the incidence of PSS in Deerhound puppies and establish the reliability of the bile acid testing procedure.

The University of Nottingham is leading a questionnaire based osteosarcoma treatment attitude survey, and another into atrial fibrillation.

The University of Nottingham is leading a questionnaire based GDV survey, to characterise the factors influencing gastric dilatation (GD) and GDV, aiming to develop guidance for owners which could help to reduce the incidence of GD and/or GDV.

SECTION 2: PRIORITIES

A meeting was held with the Deerhound Club health representatives on 9th August 2018 to discuss Section 1 of the BHCP and agree the priority issues for the health of the breed.

The literature review highlighted dilated cardiomyopathy (DCM) in the breed, it was surprising that no prevalence estimates had been published in peer-reviewed papers, but this is probably due to the numerically small population of the breed.

Whilst no papers relating to dermatological conditions in the breed were found in the literature review the breed representatives mentioned that sebaceous cysts, allergies and mites anecdotally appear to affect the breed. It was further noted that woolly or hairless coat types could be associated with particular conditions but this has not been researched to date.

With regard to endocrine conditions, it was noted that thyroid problems have been seen in the breed; however this was not considered to be a breed-specific issue.

The sole gastrointestinal condition found in the literature review was GDV; the breed representatives acknowledged that this is a priority concern for the Deerhound.

The hepatic category of the literature review comprised portosystemic shunt. The Deerhound Club is currently running a screening scheme to collect data for future research prospects and expects all breed club members to participate. This is also a recommendation on the Assured Breeders Scheme with potential scope to be upgraded to a requirement once the Kennel Club's new 'customer relationship management' (CRM) software is implemented. This condition is extremely distressing for the owners and dogs affected and therefore the breed are keen to spread the importance of litter screening to breeders outside of their clubs' sphere of influence.

No literature could be found for the breed with regard to immunological conditions, however it was raised that steroid responsive meningitis arteritis (SRMA) appears to affect the breed. There have also been reports of 'Deerhound neck' or dogs showing severe head and neck pain, which could be a result of SRMA or underlying musculoskeletal conditions. One possible condition implicated is osteoarthritis of cervical articular facet joints. This is thought to be common in the breed and could be seen in similarly shaped dogs, specifically other sighthound breeds. The other musculoskeletal condition noted was osteochondrodysplasia. The breed representatives agreed that this had been seen in dogs of the breed, particularly in the 1980s, but is not considered a problem in the breed currently.

The neoplastic or cancer category had one specific condition listed, osteosarcoma. The breed representatives were aware of the high prevalence and heritability of the condition, which may be due to at least two genetic risk factors. The breed club is

currently waiting for further research opportunities for this condition. There have also been anecdotal reports of leukaemia, lymphoma and haemangiosarcoma in the breed.

Whilst no neurological condition was found for the breed in the literature review, the breed noted that older dogs are often affected with a tremor and weakness in the back legs, which in severe cases can lead to euthanasia. This is also thought to be seen in other large breeds such as Great Danes and Irish Wolfhounds.

Although no reproductive conditions were highlighted in the literature, it was raised that Deerhounds often appear to experience secondary inertia during whelping.

Whilst no respiratory condition was noted in the literature review, anecdotal reports of laryngeal paralysis and respiratory infections have been seen in the breed. Both conditions were also noted in the insurance data for the breed.

Urolithiasis – cysteine was found in the literature review as a potential predisposition in the breed. It was noted that research into the genetic basis of cystinuria is ongoing in many breeds but with few breed-specific markers yet found. With regard to the Deerhound the cases seen appear to be sporadic, although anecdotally affecting male dogs more often.

The 2004 and 2014 Purebred and Pedigree Breed Health Survey results were reviewed, with the results supporting the concerns discussed. Further to these, pyometra and aggression were also reported. It was noted that aggression could be secondary to pain in an individual.

The insurance data were assessed by the group, and followed the findings from the literature review and the 2004 and 2014 Purebred and Pedigree Breed Health Survey results. The insurance data also indicated a number of dogs affected by laryngeal paralysis, although with no degree of severity available. With regard to the Swedish data the breed are at a higher risk of cardiomyopathy, pyometra, pneumonia and lower respiratory tract infection/inflammation.

Two breed specific health surveys from 1996 and 2011 have been undertaken by the American breed club. Again in the most recent survey cardiomyopathy, osteosarcomas and head or neck pain were reported in dogs. The ongoing mortality survey also reflects the data from previous sources but is acknowledged to be skewed towards older dogs. It was also noted that misdiagnosis of conditions can skew the results given. The DCM prevalence study undertaken at the University of Liverpool suggested that the condition had an 8.33% prevalence in the UK population, however it was noted that this may be artificially low.

Canine Health Schemes data were discussed; participation in any of the schemes is not currently a recommendation or requirement for the breed under the Assured Breeder Scheme. With regard to DNA tests available there are currently no tests recognised by the Kennel Club. It was raised that dogs who have been found to be affected by Factor VII deficiency are often only mildly affected and this does not appear to have a profound welfare impact.

Genetic diversity measures were discussed, the breed has an estimated effective population size of 60.0, which is within the area at which there is concern. The use of popular sires was noted and will highly contribute to this. The rate of inbreeding for the breed appears to be plateauing.

The group agreed from the information provided and their own experience that the priorities for the Deerhound were dilated cardiomyopathy, osteosarcoma, gastric dilatation-volvulus syndrome, neck pain and portosystemic shunt.

SECTION 3: ACTION PLAN

- The Deerhound Club to continue to encourage participation in the liver shunt screening.
- The Kennel Club to enquire over the possibility of further publicising the importance of live shunt screening.
- The Kennel Club to discuss with the Animal Health Trust the possibility of investigating the genetic basis of portosystemic shunts.
- The Deerhound Club and the Kennel Club to continue to monitor the outcomes of the DCM research currently being carried out by Dr Emily Dutton.
- The Deerhound Club to investigate whether other sighthound breed clubs have witnessed neck pain in their breeds, and whether referral centres have seen such cases.
- The Kennel Club to monitor ongoing GDV and osteosarcoma research.
- The Deerhound Club to continue to encourage owners to participate in their mortality survey.
- The Kennel Club to enquire regarding the progress of past research with the University of Nottingham.
- The Kennel Club will review progress with the Deerhound Club health representatives in late 2019.

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