



## Original Article

## An online health survey of Dogue de Bordeaux owners and breeders with special emphasis on cardiac disease

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## ABSTRACT

A questionnaire-based study was undertaken to assess health problems affecting the Dogue de Bordeaux breed of dog and, in particular, the potential impact of cardiac disease. An online survey tool was used to design a questionnaire for Dogue de Bordeaux owners and breeders. After 1 year of response time, information was collected on 278 dogs owned by 215 individuals, mostly based in the United Kingdom. Of the 278 dogs, veterinary attention had been sought for chronic skin disease in 63 (22.7%), lameness in 43 (15.5%), gastrointestinal signs in 37 (13.3%) and neoplasia in 28 (10.1%). Cardiac disease was reported in 13/278 dogs (4.7%). At the time of completion of the survey, 55 (19.8%) dogs were dead, 17 (31%) of which were reported to have died suddenly and unexpectedly. Respondents expressed interest in a formal cardiac health screening scheme in the Dogue de Bordeaux breed, but would be reluctant to volunteer for such a scheme if information on disease detected during screening was open access. The incidence of sudden unexpected death was high; although there was no corroboration that the sudden deaths were related to cardiac disease, a possible connection should be explored further.

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## Introduction

The Dogue de Bordeaux (DdB) is a working Mastiff breed of dog, which increased in popularity in the United Kingdom (UK) from 1998 to 2007 (Asher et al., 2009). In an epidemiological study based on information from electronic patient records, the DdB was reported to have the shortest lifespan of dogs in England (O'Neill et al., 2013). Cardiac diseases, including aortic stenosis and cardiomyopathy, have been described in the DdB (Borgarelli et al., 2006; Höllmer et al., 2008; Martin et al., 2010; Oliveira et al., 2011; Ohad et al., 2013). Reports of adult-onset cardiac disease in DdBs are limited, particularly in the UK population.

Breed surveys organised by the UK Kennel club in 2004 and 2014 reported data on 71 and 139 living DdBs, and five and 19 deceased DdBs, respectively. The 2004 survey reported cardiac disease in only one living DdB, whilst the 2014 survey did not report cardiac disease in any living DdBs. Death was attributed to a cardiac cause in 1/5 dogs (20%) in the 2004 survey and in 4/19 dogs (21%) in the 2014 survey.

On the basis of anecdotal experience of some DdB owners and the perception of some veterinary cardiologists that supraventricular tachyarrhythmia was prevalent in the breed, we suspected that cardiac disease might be under-recognised or under-reported in the DdB. The aim of this study was to investigate how heart disease might manifest itself in a large population of DdBs. To estimate the clinical impact of heart disease on the DdB breed, we designed a questionnaire-based study for completion by owners and breeders. A cardiac score was used to objectify responses. We hypothesised that cardiac disease was common and that sudden unexpected death, potentially attributable to cardiac disease, might also be prevalent in the breed.

## Materials and methods

The questionnaire was written by veterinary surgeons with an interest in cardiology and experience with questionnaire-based research. It was refined following review by DdB breed council members (Northern Dogue de Bordeaux Club; Dogue de Bordeaux Club of Great Britain; Welsh and West of England Dogue de Bordeaux Club), then further refined after testing on non-clinical, dog-owning staff of the Queen Mother Hospital for Animals, Royal Veterinary College, London, UK. Questions were reformatted as necessary and transferred to an online survey tool.<sup>1</sup> The survey

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**Table 1**

Cardiac score system used to objectify the likelihood of heart disease being present in 278 Dogues de Bordeaux.

Clinical finding	Score
Heart murmur	1 point
Abdominal distension	1 point
Breathlessness	1 point
Cough	1 point
Exercise intolerance	1 point
Syncope/collapse	2 points
Arrhythmia	2 points
Congestive heart failure diagnosis by veterinary surgeon	5 points
<b>Total</b>	<b>Number of dogs</b>
Score $\geq$ 4 possible cardiac disease	14
Score $\geq$ 5 probable cardiac disease	16

contained questions regarding the geographical location of respondents, whether they were breeders, pet owners or primarily show exhibitors, clinical signs and reported diagnoses, and dietary formulation.

The survey was designed with an emphasis on heart disease. The presence of clinical signs of heart disease was evaluated using 'yes/no' style questions, including breathlessness, cough, exercise intolerance, abdominal distension and syncope/collapse, as witnessed by the respondents. The presence of heart murmur, cardiac arrhythmia and diagnosis of congestive heart failure (CHF) was evaluated according to each respondent's recall of the veterinary surgeon's diagnosis. Other clinical signs of non-cardiac disease were also interrogated in the same manner, including weight loss, vomiting, diarrhoea, polydipsia, polyphagia and seizures. For dogs that had died, respondents were asked if the dog had been euthanased by a veterinary surgeon and, if not, whether the dog had died suddenly and unexpectedly. Several questions were included to assess the attitude of respondents to a formal cardiac health screening programme in the breed. Ethical approval was given by the Clinical Research and Ethical Review Board at the Royal Veterinary College (approval number URN 2016 1608, date 27th September 2016).

The survey was opened in February 2014, and was publicised at DdB dog shows and online using social media breed groups. The survey was closed after 12 months. Descriptive statistics were calculated using SPSS Statistics 22 for Windows (IBM). A cardiac score was developed based on the presence or absence of clinical signs of heart disease to objectify the likelihood of heart disease being present. Points were allocated for both owner-reported signs and veterinary surgeon-reported findings or diagnoses up to a maximum of 14 points (Table 1) and scores were calculated in a blinded manner. A cardiac score  $\geq$  4 was designated as 'possible cardiac disease' and a cardiac score  $\geq$  5 was designated as 'probable cardiac disease'.

## Results

Responses were completed by 215 owners for a total of 278 individual dogs. Responses originated worldwide, but 177 (82.3%) were reported from the UK and demonstrated a geographical spread over the country (see Appendix: Supplementary Fig. 1). Approximately 45% of respondents were involved in dog breeding or showing and 51% owned more than one dog (Table 2).

Table 3 summarises the data provided on DdB by survey respondents. Of the 278 DdB, 51.8% were male and 25.9% of all dogs were neutered. Current illness was described in 44 (15.8%) dogs. Veterinary advice was reportedly sought for illnesses in 129 (46.4%) dogs in the 3 years prior to survey completion. Thirty-seven (13.3%) dogs had exhibited gastrointestinal signs, with vomiting or diarrhoea being reported in 31 (11.2%) dogs, and a diagnosis of gastric dilatation and volvulus (GDV) in 10 (3.6%) dogs. The histopathological diagnosis of suspected neoplasia in 28/278 (10.1%) dogs is summarised in Table 4. Fifty-five of 278 (19.8%) dogs were dead at the time of survey completion.

Heart disease had been diagnosed by a veterinary surgeon in 13/278 (4.7%) dogs, four of which were prescribed treatment for heart disease. Specific diagnoses were not consistently available, but four dogs were reportedly diagnosed with cardiomyopathy and one dog with heart disease requiring pacemaker

**Table 2**

Population characteristics of the 215 survey respondents.

	Category	Number
Geographical origin	United Kingdom (UK)	177 (82.3%)
	Europe (non-UK)	4 (1.9%)
	Other (non-European)	17 (7.9%)
	Unanswered	17 (7.9%)
Primary type of ownership	Pet owner	100 (46.6%)
	Show exhibitor	68 (31.6%)
	Regular or occasional breeder	33 (15.3%)
	Unanswered	14 (6.5%)
Number of dogs owned	One	93 (43%)
	Two	39 (18%)
	Three to Four	41 (19%)
	Five or more	31 (14%)
	Unanswered	11 (5%)
Litters bred per year	Less than one	39 (18.1%)
	One	14 (6.5%)
	More than one	4 (1.9%)
	Unanswered	158 (73.5%)
Kennel club registered	Yes	171 (79.5%)
	No	28 (13%)
	Unanswered	16 (7.4%)
Regularly attend shows	Yes	82 (38.1%)
	No	121 (56.3%)
	Unanswered	12 (5.6%)

implantation. Prescribed heart medications were reported for three dogs and included pimobendan ( $n=3$ ), furosemide ( $n=2$ ), digoxin ( $n=1$ ), sotalol ( $n=1$ ), ramipril ( $n=1$ ) and spironolactone ( $n=1$ ). A heart murmur was reported in 16/278 (5.8%) dogs, five of which had the murmur diagnosed as a puppy. Eighteen dogs were reportedly referred to a cardiology specialist. Using the blinded clinical score system, 16/278 (5.8%) dogs were classified as 'possible cardiac disease' and 14/278 (5.0%) dogs were classified as 'probable cardiac disease'.

Sudden unexpected death was reported in 17 dogs (10 male and 7 female dogs), representing 31% of all reported deaths. Death was attributed to cardiac cause in 6/17 (35%) dogs with sudden death. Heart disease was diagnosed ante-mortem in 5/17 (29%) dogs that died suddenly; four of these were receiving cardiac medication at the time of death. Post-mortem examinations were performed on 4/17 (23.5%) dogs with sudden death; respondents recalled a diagnosis of unspecified heart disease in one dog and no diagnosis in three dogs. No other dogs that died suddenly had a cardiac score suggestive of heart disease. Euthanasia or death was associated with known, pre-existing, disease in the other 38 dogs that died. Euthanasia attributed to signs associated with heart disease was recorded for three dogs. Neoplasia was reported in 14 dogs and renal disease in six dogs, but the reason for euthanasia was not specified in 14 cases. Respondents did not provide sufficient information for any evaluation of age at the time of death.

The final survey questions sought information on attitudes to a cardiac health screening scheme in the DdB; 163 respondents supported a systematic cardiac health screening scheme, 12 did not support the scheme and 40 did not answer the question. However, when asked if they would be willing to participate in a voluntary cardiac health screening scheme, where the results were open access, only 82 respondents were willing to participate; 10 declined and 123 did not answer the question.

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