Morbidity and mortality in 928 dobermanns born in the Netherlands between 1993 and 1999

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The morbidity and mortality among 928 dobermann dogs born between 1993 and 1999 were investigated by sending questionnaires to their owners; 340 (37 per cent) responded. Eighty-one of the dogs had died. Proportional mortality was high for heart failure (14·8 to 22·2 per cent), behavioural problems (19·8 per cent) and cancer (13·6 per cent), but low for hepatitis (3·7 per cent) and cervical spondylomyelopathy (2·5 per cent). Of the 259 surviving dogs, 132 were suffering from various disorders, with a high prevalence of skin problems (22·4 per cent) and urinary incontinence (15·8 per cent).

THE dobermann may, like other breeds, develop breed-specific and non-breed-specific diseases. Three diseases with a probable hereditary nature have been described. Dobermanns have a higher risk of developing and dying from
cardiac disease (Bonnett and others 1997, Calvert and others 1997, Tidholm and Jonsson 1997, Tidholm and others 2001, Proschowsky and others 2003a, b), and they also have a higher incidence of cervical spondylomelopathy (Mason 1977, VanGundy 1988, Rusbridge and others 1998, Burbidge and others 1999) and chronic hepatitis (Johnson and others 1982, Thornburg and others 1983, Crawford and others 1985, van den Ingh and others 1988, Speeti and others 1996, Mandigers and others 2004). Dobermanns also tend to have a high incidence of behavioural problems (Unshelm and others 1993, Michell 1999, Proschowsky and others 2003b) and an increased risk of accidental injury (Bonnett and others 1997, Proschowsky and others 2003b). However, current knowledge of their morbidity and longevity is either based on a small number of dogs or biased towards a referral hospital population; although the latter provides reliable data, it is not a fair representation of the population of dobermanns seen by practitioners. For example, there are two studies of the incidence of chronic hepatitis in large groups of normal dobermann dogs, by Speeti and others (1996) and Mandigers and others (2004). Their estimates are based on the incidence of subclinical hepatitis (which may precede clinical hepatitis), which had an estimated incidence of 5·7 per cent in the study by Mandigers and others (2004), and 3·3 to 8·1 per cent in the study by Speeti and others (1996). However, on the basis of unpublished records of the Department of Clinical Sciences of Companion Animals of Utrecht University, there were only eight cases of hepatitis among 6538 dobermanns, or 0·12 per cent. This much lower incidence appears to be supported by two recent studies by Bonnet and others (1997) and Proschowsky and others (2003a), in which the disease is not mentioned.

This paper describes the results of a questionnaire survey of a representative group of 928 dobermann owners to investigate the morbidity and mortality among dobermanns in the Netherlands.

MATERIALS AND METHODS

During December 2002, questionnaires were sent to 928 owners of dobermanns registered by the Dutch Kennel Club. The owners were selected from a total of 6538 registered dobermanns born between January 1993 and December 1999, and in each year, 14 out of each 100 dogs (14 per cent) were selected at random. If no address was known or the owner had moved abroad, the next dog in the same litter was chosen.

The questionnaire (a copy in Dutch is available on request from P. J. J. M.) consisted of 45 questions and a freepost return envelope was included. The first part requested information about whether the dog had been neutered, if so when, and whether it was still alive. If the dog had died, the owner was asked to choose from the following list of possible diagnoses: epilepsy, cervical problems, back (spinal) problems, other neurological problems, joint/skeletal disorders, skin, mouth/teeth, nose, ears, eyes, respiratory problems, coughing, cardiac problems/heart failure, liver problems, jaundice, (occasional) vomiting, gastric problems, (occasional) diarrhoea, renal problems, incontinence (passive or active), and others to be specified. The questions were presented as a check-off list, and multiple answers were allowed. If an answer was marked, the owner was asked to give more details and provide, if possible, a statement from the veterinarian consulted. If the dog had died, the owner was then asked to return the questionnaire. If the dog was still alive, the second part of the questionnaire requested information about its annual vaccinations, the type and brand of food it was given, the frequency of feeding, the environment of the owner and the dog, and the exercise given to the dog. The third part of the questionnaire inquired about the health status of the dog, and, as before, owners could select from several options. In addition to the disorders listed above, the following diseases could be indicated: polyuria/polydipsia (amount to be specified), bladder problems, anal sac problems and endocrine problems (thyroid gland, diabetic, pancreatic, adrenal gland). As in the first part, the owners could select more than one answer and they were asked to elaborate on their responses. The last part of the questionnaire was a control for the previous question. The owners were asked whether any surgery of diagnostic examination (radiographs, ultrasound examinations, and blood examinations) had ever been performed and, if so, for what reason. Not all the responses will be discussed in this article, as the second section on food, environment and exercise will be analysed as part of a separate study. None of the diagnoses was verified by the authors, the accuracy/honesty of the owners and/or veterinarian treating the dogs being relied upon.

Data analysis

The data were analysed by using Excel (Microsoft) and the software package Statistix 8.0 for Windows (Analytical Software). Descriptive statistics were calculated for general data such as age, weight and coat colour. For continuous data, *t* values were calculated, and for categorical data the chi-

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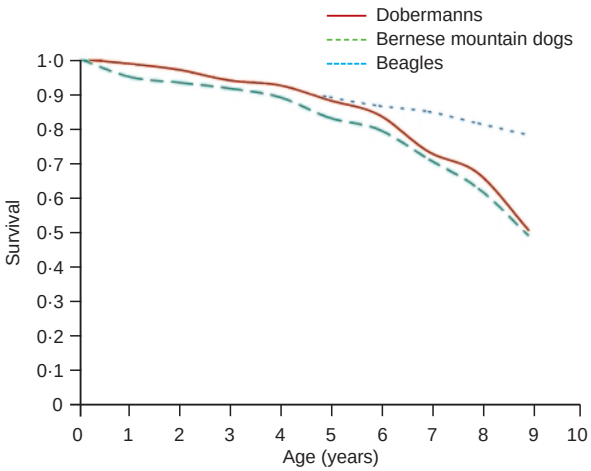

FIG 1: Survival curve of the 340 dobermanns and, for comparison, the Bernese mountain dog and beagle (reproduced with permission from Egenvall and others [2000b], with permission from Elsevier)

squared test was used. The level of significance was set at $P<0{\cdot}05$. A survival curve was calculated for three age categories: up to one year of age, from one to eight years of age, and nine years and older. An average annual mortality was calculated by using the true rate formula (approximate denominator) according to Martin and others (1987) as (the number of deaths during each year)/(the average number at risk during that year). The end of 2002 was taken as the end point because this was when the questionnaires were completed. For the dogs born in 1993, the mortality rate for each year could be calculated up to 2002 (in total nine years), but for the dogs born in 1999, it could be calculated for only three years. This survival curve has been compared with the survival estimates published by Egenvall and others (2000b). The survival curve was also compared with that of two other breeds, one so-called higher risk breed, the Bernese mountain dog, and a breed with a lower risk, the beagle (Egenvall and others 2000b). The proportional mortality for each cause of death was calculated as (the number of deaths due to a specific cause)/(the number of dogs that died) (Bonnett and others 1997).

RESULTS

Of the 928 questionnaires, 465 were sent to owners of a male dog and 463 to owners of a female dog. There were 340 responses (37 per cent) and each year of birth was equally represented (Table 1). Of the responding owners, 153 had a male dog and 187 had a female dog.

TABLE 1: Numbers of dobermanns born in each year, and the numbers of questionnaires sent out and returned

Year	Births	Number of Questionnaires sent out	Number (%) of questionnaires returned
1993	1021	132	48 (36)
1994	1129	170	58 (34)
1995	1255	187	60 (32)
1996	996	144	65 (45)
1997	800	114	38 (33)
1998	737	105	47 (45)
1999	600	76	24 (32)
Total	6538	928*	340 (37)

* Number of questionnaires sent out represented 14·2 per cent of the total number of dobermanns born

Mortality

In total, 81 (24 per cent) of the dogs were reported to have died. Approximately 1·4 per cent died during their first year, and 50 per cent had died by the time they had reached the age of nine years (Fig 1). There was no influence of coat colour or neutering status on mortality. Heart failure was indicated as the cause of death in four females and eight males, and acute heart failure was suspected as the cause of sudden death in a further six male dogs (Table 2). Three dogs had been euthanased as a consequence of epilepsy and two because of cervical spondylomyelopathy. Five dogs had been euthanased because of severe gastrointestinal diseases, including gastric dilation and volvulus in two male dogs. Other reasons indicated as the cause of death or the reason for euthanasia were liver cirrhosis in three dogs (two females and one male, confirmed by histopathology in two), renal failure in one dog and skin problems in one dog (Table 2). Infections were recorded in four dogs, including two that died from pneumonia. Seven dogs were reported to have died after being hit by a car. Sixteen dogs (11 males and five females) were euthanased because of behavioural problems, 13 because of aggressive behaviour towards people and three because of sheep-worrying. Tumours were found in 11 dogs; four had an unspecified bone tumour, two had a liver tumour and the other five had other types of tumour. In seven of the dogs it was not possible to specify the cause of death because they had various clinical signs suggestive of multiple organ failure. Old age was indicated as a reason for euthanasia in only three dogs.

Morbidity

Of the 259 dogs still alive, the owners of 201 (78 per cent) visited their veterinarian regularly, for example, for vaccinations. The other 58 owners reported that they only visited their veterinarian in the event of serious illness. The weight of 217 dogs was recorded; the mean weight of the male dogs was 39·4 kg (median 40 kg, range 22 to 60 kg) and of the female dogs 32·3 kg (median 32 kg, range 16 to 48 kg).

The question 'Do you consider your animal to be healthy?' was answered unconditionally positively by 213 owners, but 95 of them reported that their dogs had several disorders. Only 29 of the 259 owners answered that their animal was not healthy.

The diseases recorded in 132 of the dogs are summarised in Table 3. No significant difference between the sexes was observed for any disorder, with the exception of urinary incontinence (37 females and four males) and liver disease (two females). Five incontinent female dogs were also reported to have polyuria/polydipsia. The owners were asked to measure their dog's water consumption, but none was able to provide a fair estimate. Thirty of the 37 incontinent female dogs had been neutered and 22 had received medication for the condition.

TABLE 2: Proportional mortality due to different causes of death of 81 dobermanns, and the mean, median and range of the age at which the dogs died

Cause of death	Number of deaths	Proportional mortality (%)	Mean age at death (years)	Median	Range
Heart failure	12	14·8	5·9	6·5	0·8-8·2
Sudden death	6	7·4	6·5	6·7	4·3-8·8
Epilepsy	3	3·7	6·3	6·8	4·0-8·0
Cervical instability	2	2·5	5·5	5·5	5·2-5·7
Gastroenteric	5	6·2	4·1	3·5	0·5-7·5
Liver cirrhosis	3	3·7	6·4	6·4	5·1-7·7
Kidney	1	1·2	4·2		
Tumours	11	13·6	6·1	5·9	3·9-8·4
Infections	4	4·9	5·7	5·8	5·1-6·4
Skin	1	1·2	4·5		
Behaviour	16	19·8	3·2	2·6	1·0-6·9
Accident	7	8·6	3·7	2·7	0·9-8·0
Unclear	7	8·6	3·5	2·8	0·2-6·9
Old age	3	3·7	7·2	6·8	6·6-8·2

TABLE 3: Morbidity due to different problems in 132 dobermanns

Problem	Number*	Percentage†
Skin	58	22·4
Eyes	6	2·3
Ears	4	1·5
Vomiting (occasional)	7	2·7
Diarrhoea (occasional)	4	1·5
Liver	2	0·8
Heart	2	0·8
Incontinence	41	15·8
Polyuria/polydipsia	16	6·2
Kidney	1	0·4
Bladder	4	1·5
Cervical	9	3·5
Back	4	1·5
Unspecified neurological	1	0·4
Joint/skeleton	18	7·0
Epilepsy	2	0·8
Respiratory	1	0·4
Tumours	1	0·4
Thyroid gland	4	1·5
Diabetes mellitus	1	0·4

* Multiple answers were possible
† Percentage of 259 dogs

DISCUSSION

The response rate of 37 per cent to this questionnaire is reasonable; the response rate to a comparable study by Proschowsky and others (2003a, b) was 20·5 per cent. The 340 questionnaires returned represent 5 per cent of the total number of dobermanns born during the period. The disadvantage of this approach to health assessment is that the diagnoses could not be validated by the authors, and although the owners were asked to provide information from their veterinarian it is possible that some owners might have misclassified their dog.

The survival curve calculated for the period is comparable to the estimated survival curve of high-risk breeds published by Egenvall and others (2000b). The dobermann has a slightly better mortality curve than the Bernese mountain dog, which has a survival rate of 33 per cent at 10 years of age (Egenvall and others 2000b). Other 'high-risk' breeds include the cavalier King Charles spaniel, the boxer and the German shepherd dog, with 10-year survival rates of 45 to 53 per cent (Egenvall and others 2000b). By comparison, crossbreeds and breeds such as beagles and poodles have an estimated survival rate at 10 years of age of between 74 and 83 per cent (Egenvall and others 2000b).

There are several reasons for this higher risk. The most common cause of death was behavioural problems, with a calculated mortality of 19·8 per cent. Studies in the UK and Denmark have a much lower mortality for this category at, respectively, 3·8 per cent (Michell 1999) and 9·7 per cent (Proschowsky and others 2003b). A possible explanation for this difference could be the difference in genotype as a result of selection for temperament. In the Netherlands, dobermanns are commonly used as guard dogs and police training dogs, whereas in the UK they are more typically family pets.

The proportional mortality due to heart failure, which is perceived by veterinarians as one of the major problems for the breed, was 14·8 per cent. This figure is comparable to the 14·4 per cent observed in a Swedish population by Bonnett and others (1997) and 9·7 per cent in the Danish population (Proschowsky and others 2003b). Dilated cardiomyopathy is the most common heart disease in the dobermann (Calvert and others 1997, Tidholm and others 2001) and is more prevalent in males and in dogs between four and 10 years of age (Calvert and others 1997). Sudden death, as the only sign of dilated cardiomyopathy in dobermanns, is estimated to occur in 20 per cent of all cases of the condition (Calvert and others 1997); in the present study the deaths of six male dogs were categorised as sudden death (7·4 per cent). If these were all due to heart failure, then the true proportional mortality due to heart failure would have been 22·2 per cent, which is higher than the earlier results. However, dilated cardiomyopathy was not a reasonable explanation for all the dogs that died suddenly; for example, one dog died at 10 months of age, and this case was unlikely to have been a typical form of the disease because it tends to occur in middle-aged dogs (Calvert and others 1997). The other five dogs that died suddenly were all middle-aged. The average risk of dying from heart failure for all breeds is 7 per cent (Bonnett and others 1997), and it is therefore reasonable to conclude that the dobermann is at higher risk.

The proportional mortality due to cancer was 13·6 per cent, comparable to the 12·9 per cent recorded in the Danish study by Proschowsky and others (2003b) but much higher than the 2·67 per cent calculated by Michell (1999) in the UK, and lower than the 22·2 per cent recorded in Sweden by Bonnett and others (1997). Too few dogs died of cancer to differentiate between the types of tumours.

The proportional mortality due to cervical spondylomyelopathy was 2·5 per cent, which was comparable to the morbidity of 3·5 per cent due to this condition. Although cervical spondylomyelopathy is frequently observed in dobermanns, the true incidence may be lower and, according to this questionnaire, it was not an important reason for euthanasia.

The proportional mortality due to hepatitis was 3·7 per cent, and two owners reported that their dog had been diagnosed as suffering from chronic hepatitis. Despite treatment, most dogs with hepatitis die within a few months (Johnson and others 1982, Crawford and others 1985, van den Ingh and others 1988). If these two dogs are included the proportional mortality would increase to 6 per cent. A proportional mortality of 3·7 to 6 per cent is in accordance with the estimates of Speeti and others (1996) and Mandigers and others (2004). The estimate of 0·1 per cent derived from the data from the University of Utrecht is probably incorrect.

The proportional mortality due to old age was 3·7 per cent, considerably lower than the 20·7 per cent calculated for the UK population (Michell 1999). If the dogs for which no definite diagnosis could be made are included in this category, the proportional mortality would increase to 12·3 per cent, which is comparable to the 12·4 per cent recorded in Sweden by Bonnett and others (1997).

In total, 95 of the 259 dobermann dogs had various diseases. The highest incidence was 22·4 per cent for skin problems, in agreement with earlier studies by Egenvall and others (2000a) and Proschowsky and others (2003a). The second most common disorder was incontinence; 37 of 154 female dogs (24 per cent) were incontinent. In total, 30 (73 per cent) of the dogs suffering from incontinence were neutered; in comparison, 53 per cent of all the dogs were neutered. Okkens and others (1997) reported the incidence of incontinence after neutering in all breeds to be 11 per cent, and Arnold and others (1989) observed an incidence of 20 per cent. It would therefore appear that the dobermann has a greater risk of developing incontinence after neutering.

Compared with other breeds, the dobermann is at a higher risk of dying as a consequence of behavioural problems, heart failure and cancer. Cervical spondylomyelopathy and hepatitis can be regarded as breed problems, but the incidence of the two diseases was lower than that of the other disorders. The estimates of the frequency of hepatitis in dobermanns would appear to be accurate. From an owner's point of view, skin problems, incontinence, heart failure and behavioural problems should be regarded as more likely problems.

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