Litter size and perinatal mortality in purebred dogs in Norway

Student paper at the Norwegian School of Veterinary Science

By Linn Therese Andersen, Kaja Sverdrup Borge,
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Kull 2002

Supervisor Astrid Indrebø
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Summary

Title: Litter size and perinatal mortality in purebred dogs in Norway

Authors: Linn Therese Andersen, Kaja Sverdrup Borge, Ingrid Toftaker and Ragnhild Tønnessen (equal authorship)

Supervisor: Astrid Indrebø, Norwegian Kennel Club, c/o Department of Companion Animal Clinical Sciences, Norwegian School of Veterinary Science.

This study was done as a retrospective cohort study of 5591 litters of 109 breeds registered in the Norwegian Kennel Club (NKC) from 01.01.2006 to 12.03.2007. The total perinatal mortality was 7.7%. The prevalence of stillborn puppies was 4.1%, while 3.7% of the live born puppies died during the first week post partum. Increasing dog size and increasing age of the dam was significantly correlated with a higher proportion of stillborn puppies. The perinatal mortality increased with increasing size of the dog and also with increasing litter size. In the vast majority of the litters (76%) there was no perinatal mortality. Perinatal mortality is low in Norway compared to studies conducted in other countries.

Mean litter size was 5.4 puppies. Litter size was significantly influenced by the size of the dog, the age of the dam and the time of year the litter was born. Mean litter size increased with dog size. Older dams had smaller litters due to age and not because of increasing litter number. There was a small, but significant seasonal variation in litter size from 5.1 to 5.8 puppies. The largest litters were found in March and the smallest in October to December. Natural mating gave a minor, but significant increased litter size of 0.19 puppies compared to artificial insemination with frozen semen, using the Norwegian catheter method.

Preface

This study is conducted as a student paper at the Norwegian School of Veterinary Science. We are four veterinary students with specialization in small animal medicine who are interested in matters of reproduction, obstetrics and paediatrics in dogs. The purpose of this study is to look at puppy mortality and litter size in purebred dog breeds in Norway and factors that might influence these. At present, there are few publications on this subject, particularly from recent years.

Our study is based on information from two forms developed by the Norwegian Kennel Club (NKC) for official registration of puppies and reproduction in dogs (Appendix V-VI). The data have been embedded in a database by NKC, but the data concerning litter size and perinatal mortality have not previously been used for research purposes. We spent a considerable amount of time and effort on ensuring that the registrations in the database were accurate and excluding those that were not. Based on this database we have composed figures and tables to describe the material and to point out some possible coherence. We hope to make the data more approachable and useful for breeders and veterinarians.

We have limited our study to litters registered from 01.01.2006 to 12.03.2007. From 01.01.2006 NKC has a complete electronical database on the registrations on litter size, stillbirth and mortality during the first week of life, and 12.03.2007 was the last date of registration before we received the NKC database.

We have already presented our study and some preliminary results at the seminar "Forskningsforum Hund" arranged by NKC in October 2007 Oslo, Norway. We plan on publishing our results in an international scientific journal in 2008.

Introduction

Previous publications on the frequency of perinatal mortality are few and often conducted on a limited population, some in one breed only (1, 2). There are, however, some studies on the causes of perinatal mortality (2, 3, 4, 5, 6, 7, 8, 9).

Perinatal mortality is defined as death of puppies in the time around birth (*peri* = greek; around, *natal* = latin; relating to birth). In this study, the definition of perinatal mortality includes stillborn puppies and puppies that died during the first week after birth. This definition was compatible with the available information from NKC. In previous studies perinatal mortality was 16.0%-31.4% (1, 9, 10).

The prevalence of stillborn puppies in different breed populations is 4.6% -10.9% (1, 9, 10, 11). Studies have shown that perinatal mortality is highest around birth and during the first week of life (1, 9, 10, 12); more than 65% of the puppy mortality from birth to weaning occurs in this period (10, 12, 13). The main cause of early puppy mortality is stillbirth, followed by dystocia (1, 9, 10, 12). Mortality of live born puppies during the first week of life was in one study 5.7% (9). Mortality of live born puppies from birth to eight weeks post partum is reported to be 7.5% - 34% (9, 14).

There are some studies on mean litter size for dogs, but we only found three other studies describing litter size for more than a few breeds (15, 16, 17). Further, we have found only one publication concerning litter size (15) and none on perinatal mortality based on an equally large number of registrations. The average litter size in former studies varies greatly among breeds and is reported to range from 2.0-10.1 puppies (2, 7, 9, 14, 17, 18, 19, 20).

Our study was done as a retrospective cohort study. The purpose of the study was to describe the prevalence of stillborn puppies, death within the first week of life, the total perinatal mortality and litter size in purebred dogs in Norway. Further, we wanted to study whether the size of the breed (bodyweight), the age of the dam, the total number of litters of the dam and the time of year for the birth had an influence on perinatal mortality and litter size, or if litter size was influenced by the method of mating (natural mating or artificial insemination).

Materials and methods

Our study was based on information from Norwegian breeders reported to NKC through a form which is filled out to register litters and puppies in NKC (appendix V and VI). These registration forms include information on the dam, the sire and the litter. The forms are also available at the NKC web page (21). By letter (appendix VII and VIII), we asked NKC for permission to make use of these electronically stored data. We received the data as a Microsoft Excel®-file. We proof read the registrations in the database, made calculations on the data and further processed the collected information into tables and figures.

The study unit was each litter registered in NKC. The reference population was the Norwegian population of purebred dogs, and the study population was purebred litters registered in NKC from 01.01.2006 – 12.03.2007.

The inclusion criterion was litters registered in NKC from 01.01.2006 –12.03. 2007.

Exclusion criteria were:

- Incomplete or incorrect registration forms
- Breeds with fewer then ten registered litters

Incomplete registration forms lead to the exclusion of 81 of the litters. Information was lacking on number of stillborn and/or number of live born and/or number of puppies alive after one week. Moreover, litters where excluded due to parameter values highly unlikely for a dog, for example extreme values of litter size and age of the bitch. These were excluded to avoid statistical error. Litter data that obviously seemed incorrect, for example more live

puppies after one week than the number of puppies born, was checked against the electronic NKC database DogWeb. DogWeb is the NKC database available on the web containing information about dogs, genealogical tables, health registrations and so on. In the cases where we did not find correct information, the litters were excluded (n = 12). Five litters were registered twice in the database (double registrations), and the extra registrations were excluded. Altogether 127 litters were excluded, resulting in a final database of 5591 litters of 109 breeds.

As to the processing of the data, different methods were used to ensure quality and correctness. When creating tables, one person was plotting the data, while another was repeating the numbers out loud. Sampling tests were also performed. Most of the charts and tables were made by copying the data directly from Microsoft Excel® files. Checking the first and the last number and sample testing were used to make sure this was done correctly.

The name of the dog breeds are British-English names according to the Kennel Club UK (22).

Outcome and explanatory variables

Litter size, stillbirth and perinatal mortality were outcome variables in this study. Explanatory variables were the size of the dog, the age of the mother, the litter number, the time of year the litter was born and the method of mating (natural mating or artificial insemination). As to the size of the dog, all breeds were sorted into one of five groups based on the bodyweight interval of the breed (Table 1).

Table 1. The different dog size groups (n= number of litters in the group). For more details on all the breeds in the different groups, see appendix IX.

Dog size group	n	Bodyweight interval
Miniature breeds	797	< 5 kg
Small breeds	1548	5-10 kg
Medium breeds	1384	10-25 kg
Large breeds	1619	25-45 kg
Giant breeds	243	> 45 kg

The bodyweight of the individual breeds is mostly given as a weight interval in the literature. When sorting the breeds into dog size groups, we used the middle value of these intervals (appendix IX).

The age of the mother is given in terms of years. Below one year of age was defined as 0-365 days. A dam of 365 to (and including) 729 days of age was reckoned as one year old. The dam was two years old from day 730 to (and including) day 1094 and so on. When looking at the different dog size groups, dams younger than one year of age and one year old dams were grouped together as <2 years due to few litters. The same was done for dams older than nine years old. The litter number was the number of the present litter of the dam (litter number two meant that the litter in our database was her second). The time of the year the litter was born was given in months. Method of mating was one out of three; natural mating, artificial insemination with fresh semen and artificial insemination with frozen semen. Unfortunately, there were also some litters in the database where method of mating was not recorded.

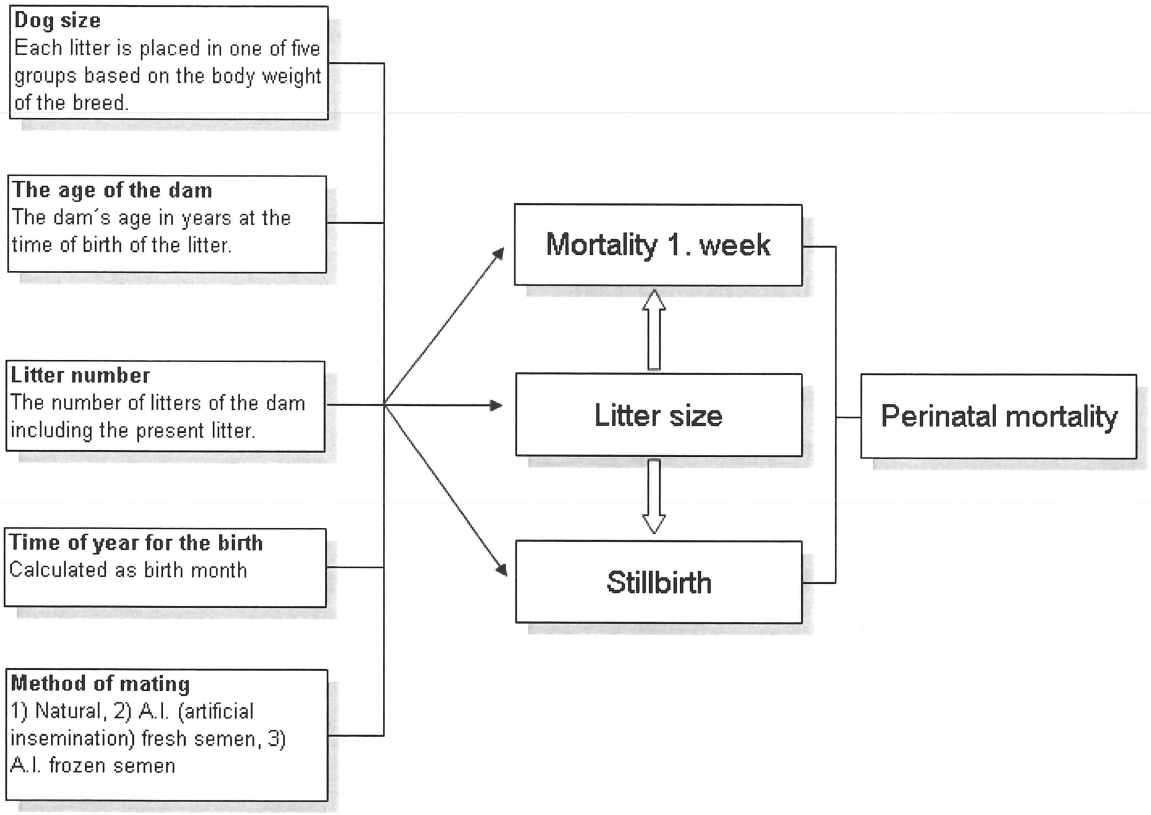

Figure 1. Outcome and explanatory variables.

It must be emphasized that the main purpose of this student paper was not fully to explain the influence of these factors, but rather to outline some possible coherence and to describe the data and through this the reference population: all purebred dogs in Norway.

Microsoft Excel® was used to make tables and charts to interpret the influence of the explanatory variables on the outcome variables. Mean values are given in our tables in stead of a median, even though the material was not truly normally distributed. For the mortality variables, the median was zero and therefore of little value. As to the litter size, the calculations of the mean and median gave approximately the same value. Value of dispersion in our tables is given as either standard deviation (SD) or range. Some of the explanatory variables in this study also interfered with each other (for example age of the dam and the

litter number), which made multivariable statistical analysis necessary. Professor Eystein Skjerve at EpiSenteret (Senter for epidemiologi og biostatistikk) at the Norwegian School of Veterinary Science has performed multivariable statistical analysis, using the software Stata®. For litter size a linear regression model was used, while stillborn and perinatal mortality were modelled using the zero-inflated model.

Results

Litter size

The mean litter size was 5.4 puppies per litter with a standard deviation of 2.62.

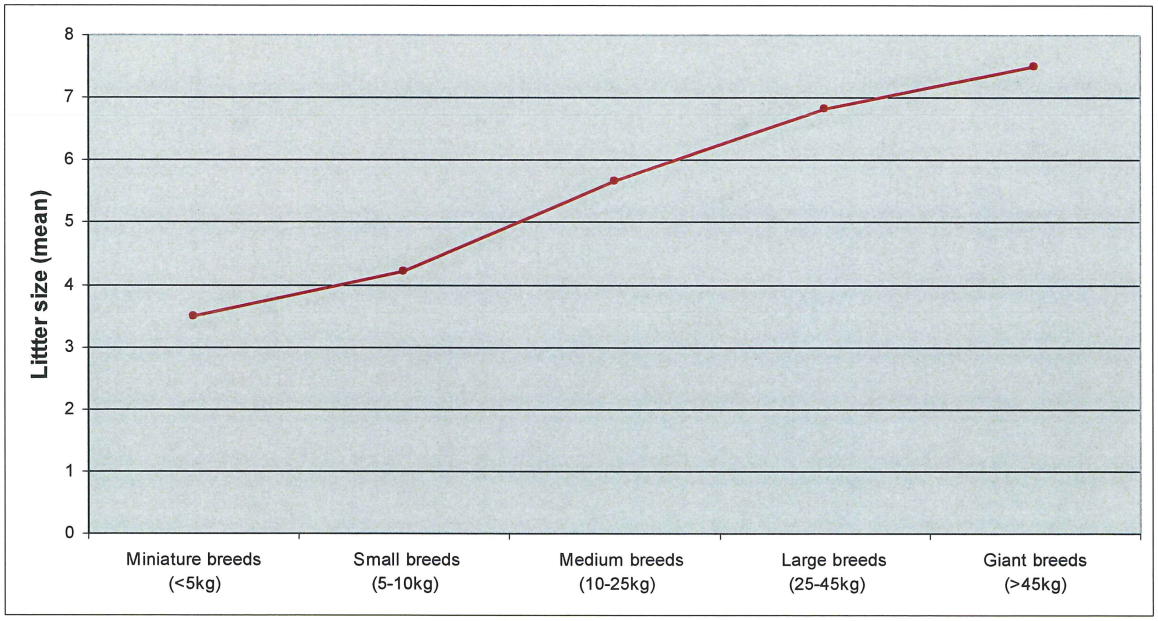

Figure 2. Mean litter size in the different dog size groups. The figure is based on 5591 litters of 109 different breeds.

Mean litter size increased with increasing size of the dog ($p<0.05$ for all dog size groups). Mean litter size was 3.5 in miniature breeds (n=797), 4.2 in small breeds (n=1548), 5.7 in medium breeds (n=1384), 6.8 in large breeds (n=1619) and 7.5 in giant breeds (n=243) (Table 2). When plotting the mean litter size for each dog size group, there is an almost linear correlation (Figure 2).

Age of the dam and dog size

The mean litter size increased up to four years of age, from 4.6 in the youngest group, to 5.6 in four year old dogs and dams over nine years had the lowest litter size (3.8) (Table 2). The mean litter size was higher for two year old dams than the younger ones, approximately constant for dams three to six years old and thereafter it declined gradually (Figure 3). Multivariable statistical analysis showed a statistical association between the age of the dam and litter size (Appendix X, Table F).

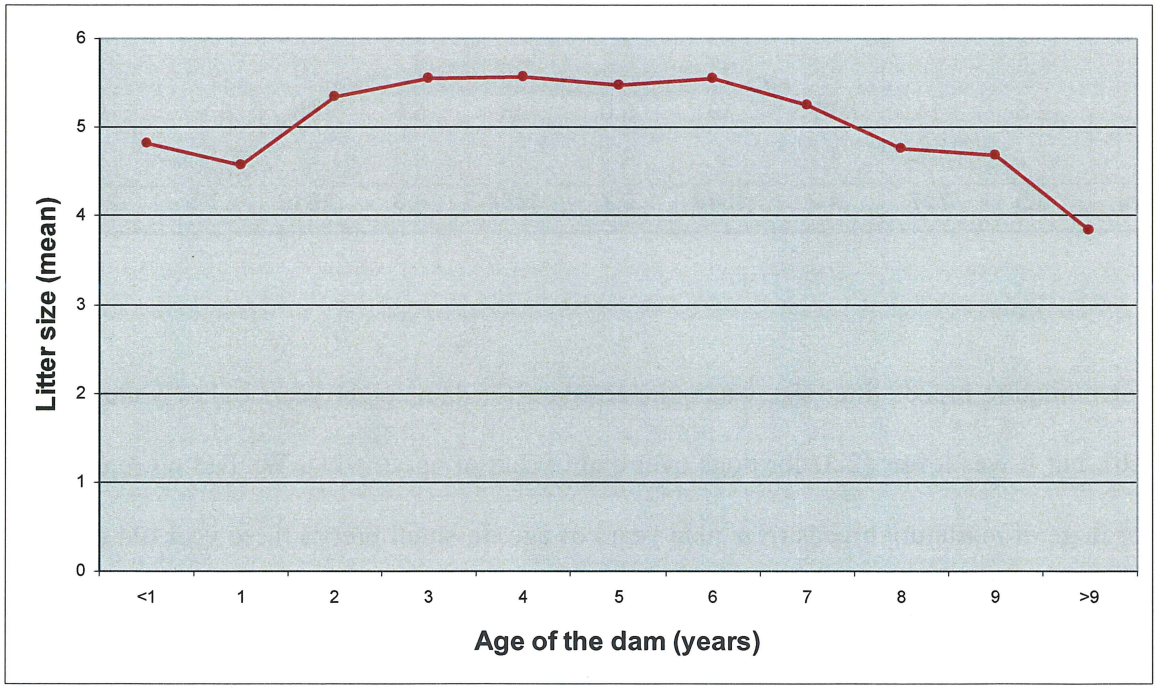

Figure 3. Litter size in relation to age of dam for the entire study population (n = 5591). <1 years means dams 364 days of age or younger. A dam was reckoned as two years old from 365 to (and including) 729 days and so on.

There were some differences between the different dog size groups regarding the association between the age of the dam and litter size, although the overall tendency was a smaller litter size in older dams.

Table 2. Mean litter size in relation to the age of the dam in the different dog size groups (n= number of litters). Miniature breeds are dogs <5kg, small breeds 5-10kg, medium breeds 10-25kg, large breeds 25-45kg and giant breeds >45kg. Age <2 means dams younger than 730 days. Dams younger than one year and one year old dams are grouped together due to a small number of litters. For the same reason, dams over nine years of age are also grouped together (≥9). Dams in this group are 3285 days or older.

Age of dam (years)	Miniature breeds		Small breeds		Medium breeds		Large breeds		Giant breeds		Total
	Mean litter size	n	Mean litter size	n	Mean litter size	n	Mean litter size	n	Mean litter size	n	Mean litter size
<2	3.5	149	4.3	188	5.5	92	6.8	41	8.1	12	**4.6**
2	3.5	205	4.2	408	5.8	249	7.0	322	7.9	67	**5.3**
3	3.5	160	4.4	315	5.7	276	6.9	371	7.7	66	**5.5**
4	3.5	117	4.1	247	5.8	224	7.2	275	7.8	50	**5.6**
5	3.4	86	4.1	177	5.7	202	6.9	253	6.4	23	**5.5**
6	3.5	39	4.1	122	5.9	155	6.5	180	6.3	17	**5.5**
7	3.6	30	4.0	63	5.4	105	6.4	90	6.5	8	**5.3**
8	2.3	11	3.3	19	5.0	46	5.5	65	-	0	**4.8**
≥9	-	0	4.1	9	4.3	35	4.9	22	-	0	**4.5**
Total	**3.5**	**797**	**4.2**	**1548**	**5.7**	**1384**	**6.8**	**1619**	**7.5**	**243**	**5.4**

For miniature breeds litter size was quite constant for dams eight years old or younger (3.4–3.6), but it was lower (2.3) for dogs over eight years of age (n=11). We had no registrations for dogs of miniature breeds over nine years of age. In small breeds three year old dams had the largest litters. The litter size declined for dams over six years, but for dams over nine years there was again an increased litter size. It must be mentioned that there were only nine litters in this group which gave a poor statistical confidence. In medium breeds, dams younger than two years had a smaller mean litter size than older dogs. In this group litter size decreased in dogs seven years of age or older. In large breeds, litter size seemed to decline for dogs over six years of age. For giant breeds, young dogs had the largest litters. For dogs over four years of age, the litter size decreased. (Table 2, Figure 4 and Figure 5).

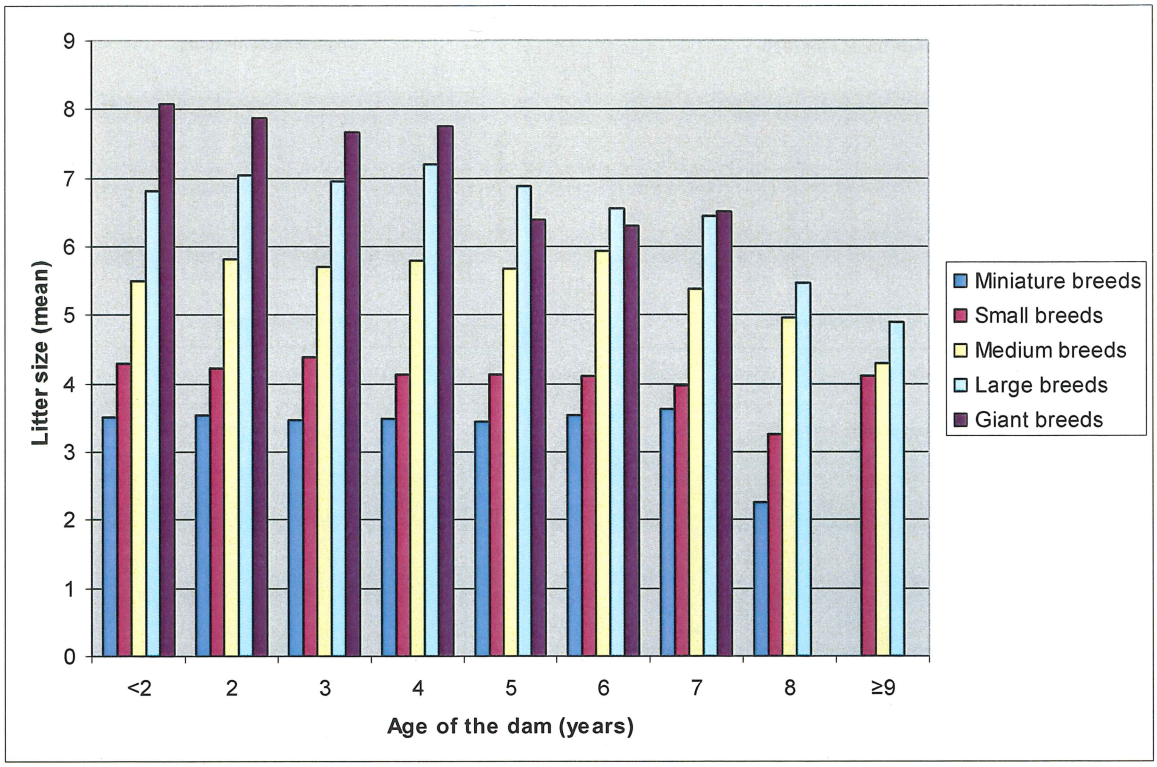

Figure 4. Mean litter size in relation to the age of the dam for each dog size group. Age <2 means dams younger than 730 days. Dams younger than one year and one year old are grouped together due to a small number of litters. For the same reason, dams over nine years of age are also grouped together (≥9). Dams in this group are ≥3285 days.

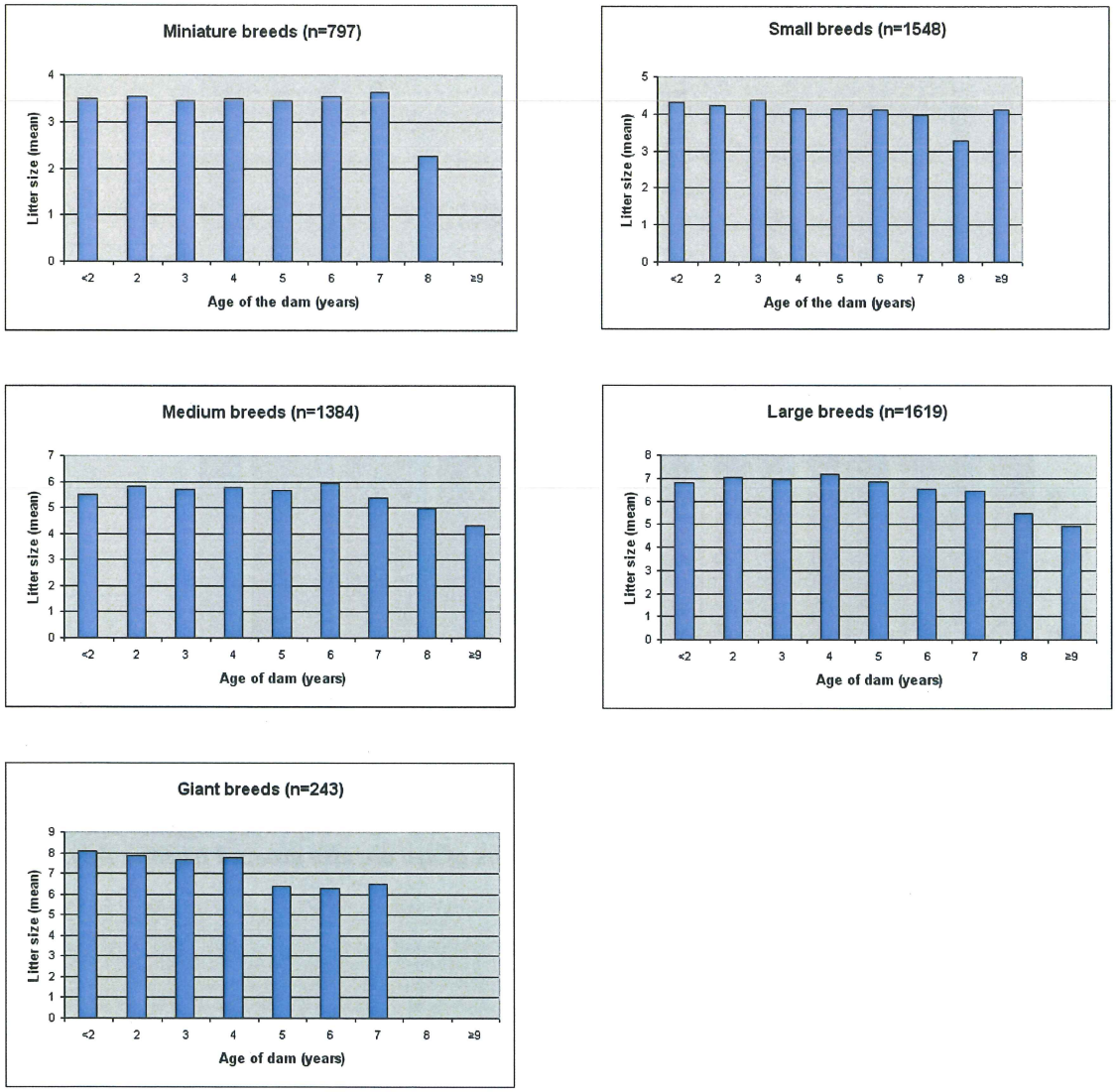

Figure 5. Mean litter size compared to age of the dam in each dog size group. (n= number of litters in the group) <2 years means dams 729 days of age or younger. A dam was reckoned as two years old from 730 to (and including) 1034 days.

Litter number

The litter size was largest in the first litter of the dam, and then gradually decreased with increasing litter number. (Table 3 and Figure 6). However, multivariable statistical analysis which also included the age of the dam, showed that the apparent negative association between mean litter size and litter number was actually due to the age of the dam. For dams

with more than five previous litters, there is a statistical association between litter number and perinatal mortality (Appendix X. Table G).

Table 3. Mean litter size for different litter numbers of the dam (CI = confidence interval, SD = standard deviation, n = number of litters). Litter number of the dam includes the present litter in our database. One litter had no registered value for the dam's litter number therefore n=5590.

Litter number	Litter size			
	n	Mean	SD	95% CI of the mean
1	2709	5.5	2.6	5.5 ± 0.10
2	1535	5.4	2.7	5.4 ± 0.13
3	778	5.1	2.6	5.1 ± 0.18
4	374	4.9	2.6	4.9 ± 0.27
5	137	4.8	2.3	4.8 ± 0.38
6	46	3.9	2.2	3.9 ± 0.65
≥7	11	4.3	1.4	4.3 ± 0.80
Total	**5590**	**5.4**	**1.4**	**5.4 ± 0.04**

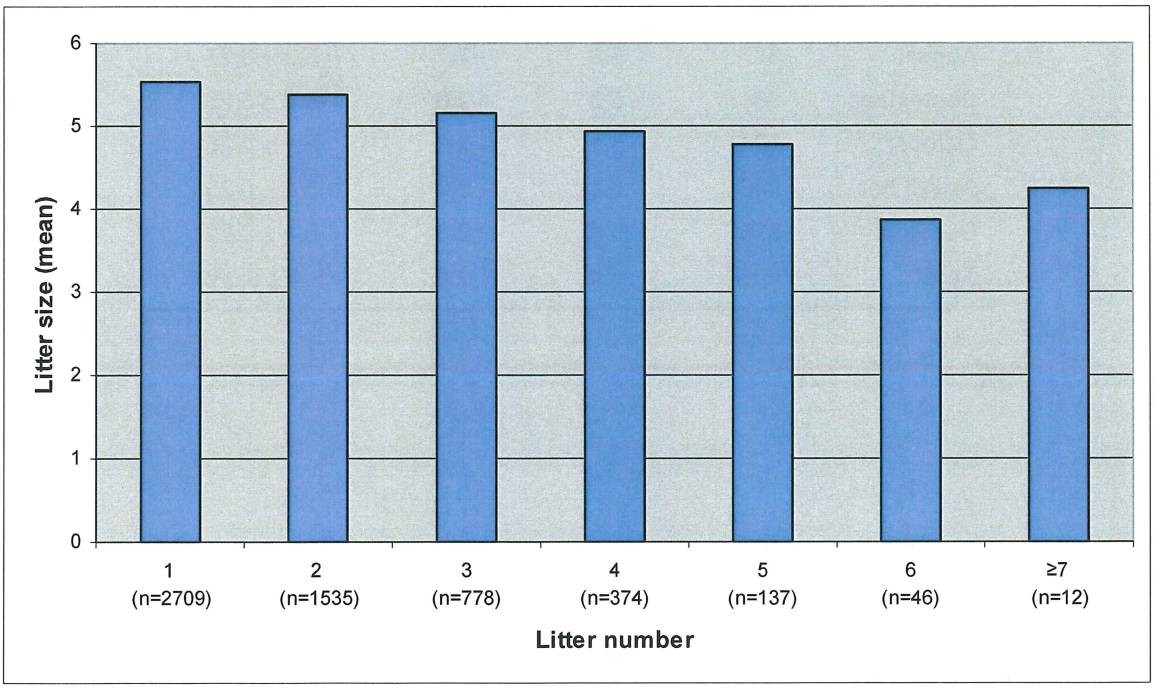

Figure 6. Mean litter size compared to the litter number of the dam. Litter number of the dam includes the present litter in our database.

Seasonal variations

It appeared to be a seasonal variation in litter size. Mean litter size varied from 5.1 to 5.8 between the different birth months of the litter. This difference in litter size was statistically significant (Table 4). The largest litters were found in March and the smallest in October to December.

Table 4. Litter size and time of year (n= number of litters, SD = standard deviation. CI = confidence interval).

Birth month	n	Litter size		
		Mean	SD	95% CI of the mean
January	529	5.2	2.6	5.2 ± 0.22
February	424	5.5	2.5	5.5 ± 0.24
March	608	5.8	2.7	5.8 ± 0.21
April	515	5.6	2.6	5.6 ± 0.22
May	478	5.5	2.7	5.5 ± 0.24
June	449	5.5	2.5	5.5 ± 0.23
July	442	5.4	2.6	5.4 ± 0.25
August	377	5.3	2.7	5.3 ± 0.27
September	381	5.3	2.6	5.3 ± 0.26
October	404	5.1	2.6	5.1 ± 0.25
November	446	5.1	2.7	5.1 ± 0.25
December	538	5.1	2.6	5.1 ± 0.22
Total	**5591**	**5.4**	**2.6**	**5.4 ± 0.069**

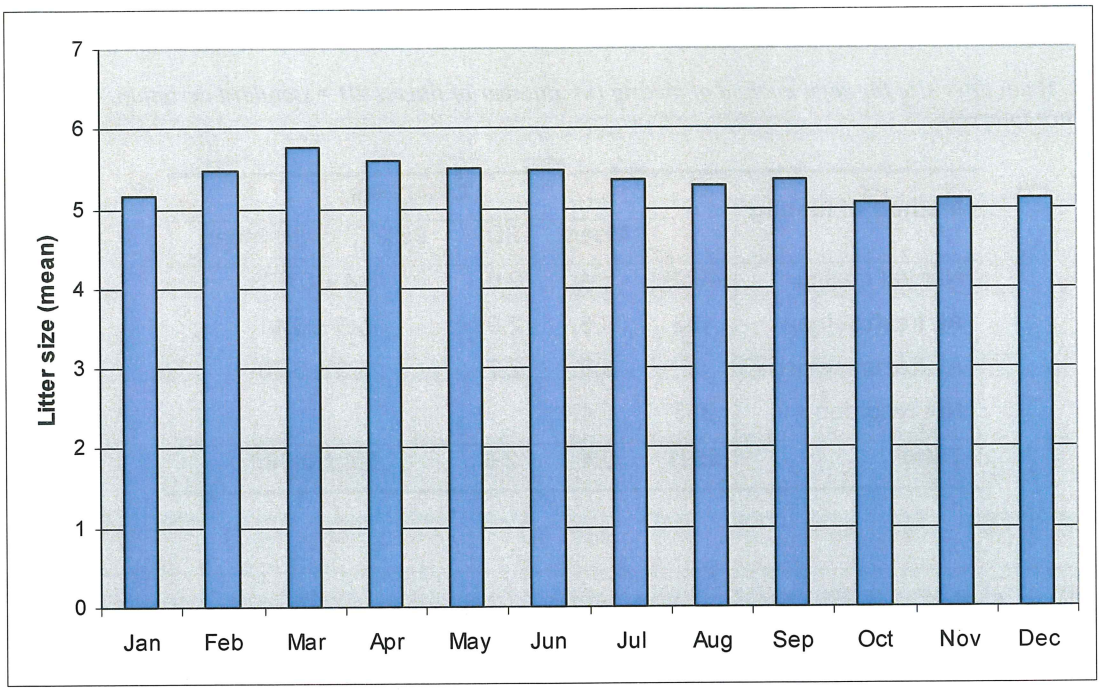

Figure 7. Mean litter size for each month of the year.

The time of year also influenced the number of litters born. Our study showed a difference in the distribution of litters between the months (Table 4 and Figure 7). More litters were born in March than in the other months. From March, there was a decline in the number of litters to August and September. Notice that March is the month with both the highest frequency of births and the largest mean litter size.

Litter size and method of mating

The large majority of the litters were conceived by natural mating (Table 5). The highest mean litter size was found in litters conceived by insemination with fresh semen (5.5). Artificial insemination with frozen semen gave the smallest mean litter size (5.3) (Figure 8). Statistical analysis showed a difference in litter size of 0,19 between natural mating and frozen semen ($p < 0.05$).

Table 5. Mean litter size for each method of mating (n= number of litters, SD = standard deviation, CI = confidence interval).

Method of mating	n	Litter size		
		Mean	SD	95% CI of the mean
Natural mating	4959	5.4	2.6	5.4 ± 0.073
AI, fresh semen	192	5.5	2.9	5.5 ± 0.41
AI, frozen semen	55	5.3	2.7	5.3 ± 0.70
Not recorded	385	5.4		
Total	**5591**	**5.4**	**2.6**	**5.4 ± 0.069**

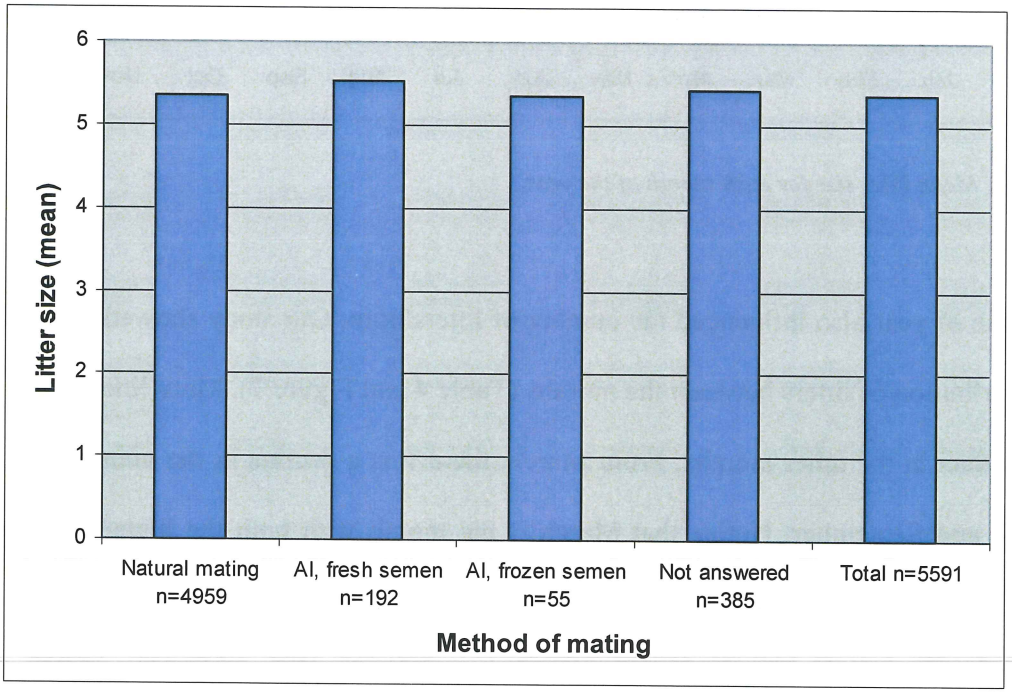

Figure 8. Mean litter size compared to method of mating. For comparison, mean litter size for the study population as a whole is also given (5.4).

As to dog size group and method of mating, AI with fresh and frozen semen was more often used within the large and giant breeds relatively than for smaller dogs (Figure 9).

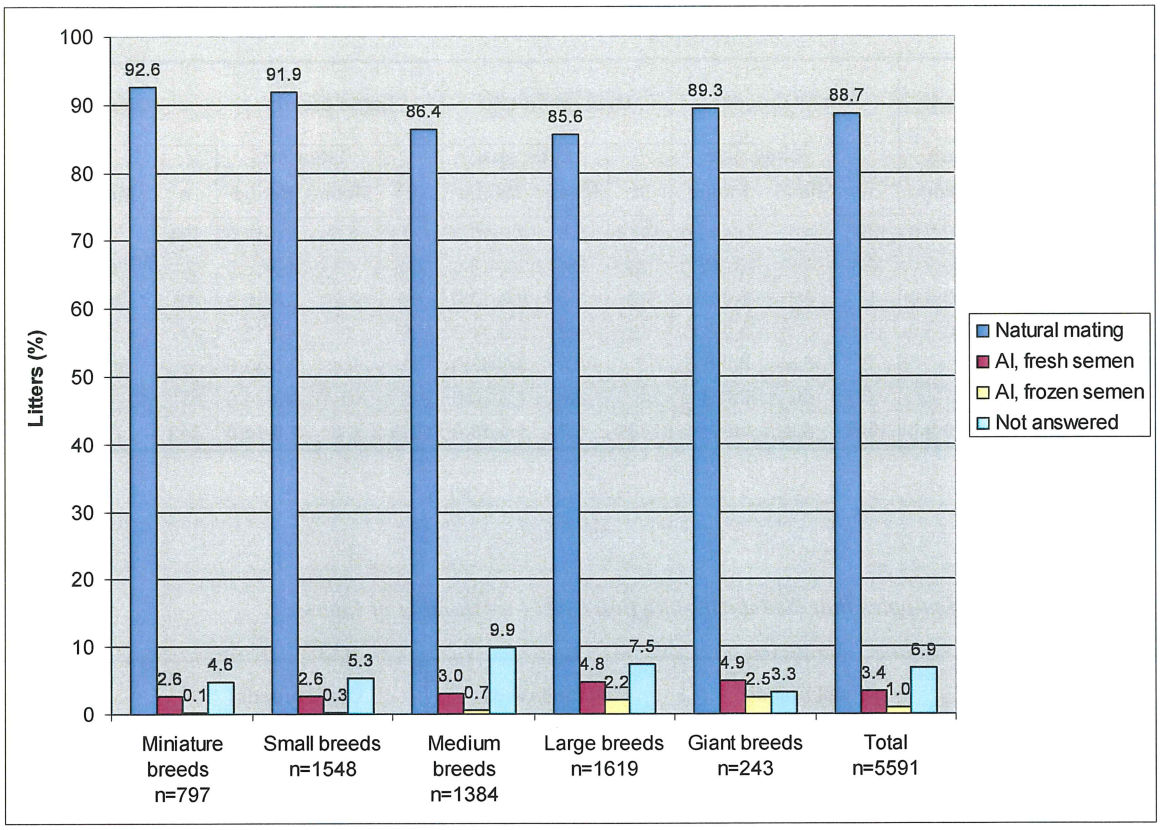

Figure 9. Litters conceived by different methods of mating in each dog size group.

Perinatal mortality

The prevalence of stillborn puppies was 4.1%. This equaled a mean value of 0.2 stillborn puppies per litter, ranging from 0 to 8 which equaled 0.0% – 16.7%. The vast majority of the litters, 85%, had no stillborn puppies, and 87% of the litters had no puppies that died during the first week of life. In 76% of the litters there was no perinatal mortality. More than four stillborn puppies occurred in only 16 litters (

Table *6*), and only 14 litters had more than four puppies that died during the first week after birth (Table 7).

Table 6. Number of stillborn in the litter (n= number of litters).

Number of stillborn	Miniature breeds			Small breeds			Medium breeds			Large breeds			Giant breeds		
		Litter size			Litter size			Litter size			Litter size			Litter size	
	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range
0	733	3.4	1.0-9.0	1398	4.1	1.0-10.0	1178	5.5	1.0-15.0	1271	6.5	1.0-14.0	194	7	1.0-16.0
1	55	3.9	2.0-9.0	124	4.7	2.0-13.0	142	6.4	2.0-13.0	215	7.6	2.0-15.0	24	8.1	3.0-11.0
2	8	4.8	3.0-8.0	17	5.1	3.0-9.0	43	6.9	3.0-12.0	86	8.2	3.0-15.0	12	9.6	6.0-13.0
3	1	5	5.0-5.0	4	6.3	4.0-8.0	12	8.1	5.0-14.0	26	9	4.0-15.0	7	11.3	8.0-14.0
4	0	-	-	2	5.5	5.0-6.0	7	8.4	5.0-13.0	11	9.4	5.0-13.0	5	10.4	5.0-17.0
>4	0	-	-	3	10	8.0-14.0	2	8.5	7.0-10.0	10	10.7	6.0-14.0	1	18	18.0-18.0
Total	**797**	**3.5**	**1.0-9.0**	**1548**	**4.2**	**1.0-14.0**	**1384**	**5.7**	**1.0-15.0**	**1619**	**6.8**	**1.0-15.0**	**243**	**7.5**	**1.0-18.0**

Table 7. Number of puppies that died during the first week (n= number of litters).

Number of dead puppies first week	Miniature breeds			Small breeds			Medium breeds			Large breeds			Giant breeds		
		Litter size			Litter size			Litter size			Litter size			Litter size	
	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range
0	711	3.4	1.0-9.0	1370	4.1	1.0-14.0	1209	5.5	1.0-15.0	1381	6.6	1.0-15.0	195	7.0	1.0-16.0
1	72	4.2	2.0-9.0	141	4.8	2.0-10.0	127	6.5	2.0-14.0	154	7.8	2.0-13.0	27	8.9	3.0-14.0
2	11	6.0	4.0-8.0	27	5.5	3.0-13.0	30	7.0	3.0-12.0	52	7.9	3.0.14.0	13	9.8	6.0-15.0
3	2	5.0	4.0-6.0	5	6.0	5.0-7.0	12	8.4	6.0-13.0	18	9.8	4.0-15.0	4	8.8	6.0-11.0
4	-	-	-	1	5.0	5.0-5.0	3	10.0	7.0-13.0	10	9.5	6.0-13.0	2	11.5	6.0-17.0
>4	1	8	8	4	7.5	6.0-9.0	3	8	6.0-10.0	4	10	8.0-11.0	2	19	10.0-18.0
Total	**797**	**3.5**	**1.0-9.0**	**1548**	**4.2**	**1.0-14.0**	**1384**	**5.7**	**1.0-15.0**	**1619**	**6.8**	**1.0-15.0**	**243**	**7.5**	**1.0-18.0**

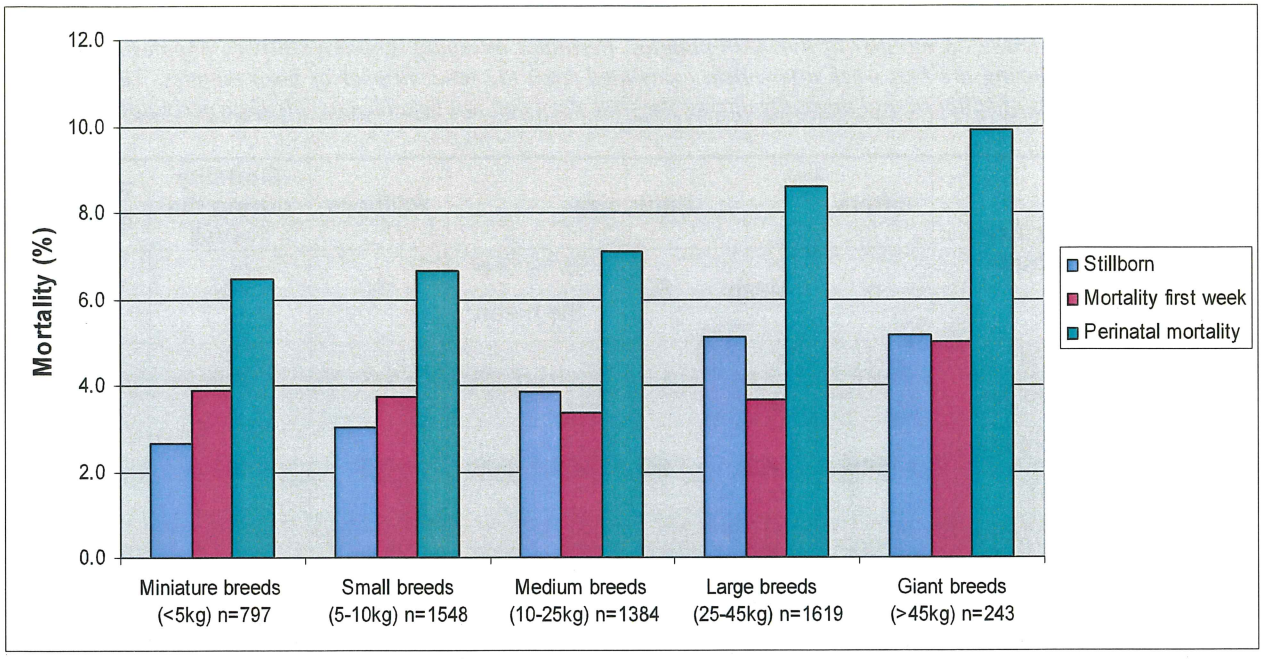

Figure 10. The prevalence of stillbirth, mortality during the first week of life and perinatal mortality in the different dog size groups. The percentages of stillborn and mortality first week can not be directly added to calculate perinatal mortality. The reason for this is that the percentage of stillborn is calculated from the total number of puppies born, while the percentage of mortality first week was calculated from number of live born puppies.

Table 8. Mean litter size and mortality rates for each dog size group. Mortality first week after birth is calculated based on number of live born puppies. Perinatal mortality includes stillborn puppies and puppies that died during the first week after birth, calculated from the total number of born puppies. Therefore, the percentages of stillborn and mortality during the first week can not be added to calculate perinatal mortality.

Dog size group	Litters	Litter size			Stillborn	Mortality during the 1.week	Perinatal mortality
	n	Mean	SD	95 % CI of the mean	%	%	%
Miniature breeds (<5kg)	797	3.5	1.7	3.5 ± 0.12	2.7	3.9	6.5
Small breeds (5-10kg)	1548	4.2	1.2	4.2 ± 0.06	3.0	3.7	6.6
Medium breeds (10-25kg)	1384	5.7	2.3	5.7 ± 0.12	3.9	3.4	7.1
Large breeds (25-45 kg)	1619	6.8	2.7	6.8 ± 0.13	5.1	3.6	8.6
Giant breeds (>45kg)	243	7.5	3.2	7.5 ± 0.40	5.2	5.0	9.9
Total	**5591**	**5.4**	**2.6**	**5.4 ± 0.07**	**4.1**	**3.7**	**7.7**

Increasing dog size was related to a higher proportion of stillborn puppies. Miniature breeds had 2.7% stillborn puppies, while giant breeds had 5.2%. For mortality first week the corresponding percentages were 3.9% and 5.0%. Medium and large breeds lost more puppies in stillbirth than during the first week post partum, while the opposite was true for miniature and small breeds (Figure 10 and Table 8). In the entire study population, more puppies were lost due to stillbirth (4.1%) than during the first week (3.7%).

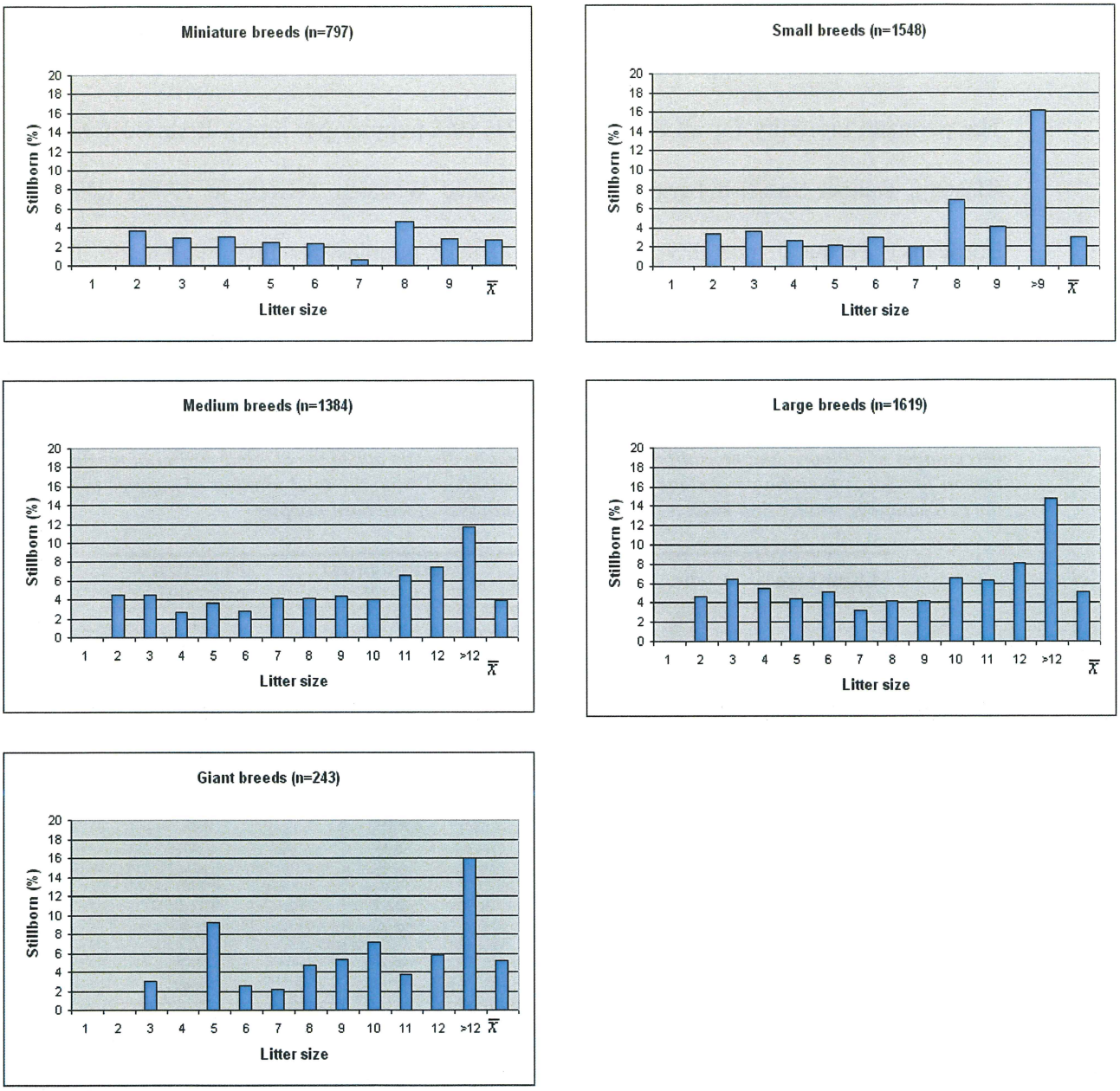

Figure 11. Prevalence of stillbirth in relation to litter size in the different dog size groups. (n= number of litters in the group)

There was an overall tendency of increasing mortality with increasing litter size. For the three largest breed groups the highest mortality rate was found in litters with ≥12 puppies. The highest stillborn rate was found in the largest litters (>9 puppies in the litter) for the small breeds. In the miniature breeds, however, the differences were smaller (Figure 11).

Of the live born puppies, 3.7% died during the first week of life (0.2 puppies per litter). Within all the breeds, puppies that died per litter during the first week ranged from 0 to 10. The perinatal mortality for all breeds was 7.7% (0.4 puppies per litter). It varied from 0.0% (Basenji, Danish Swedish Farm Dog, Soft Coated Wheaten Terrier) to 27.8% (Dogue de Bordeaux). Perinatal mortality ranged from 0 to12 puppies per litter within the different breeds.

Table 9. The prevalence of stillbirth, mortality during first week of life and perinatal mortality. The percentages of stillborn and mortality first week can not be directly added to calculate perinatal mortality. The reason for this is that the percentage of stillborn is calculated from the total number of puppies born, while the percentage mortality first week is calculated from number of live born puppies.

Litter size	n	Stillborn	Mortality first week	Perinatal mortality
1	284	0,0	0,0	0,0
2	457	3,7	2,4	6,1
3	719	3,9	3,5	7,4
4	844	3,1	3,2	6,3
5	808	3,2	3,2	6,4
6	745	3,4	3,4	6,8
7	596	3,2	2,8	6,0
8	434	4,4	3,8	8,2
9	308	4,3	3,6	7,9
10	182	6,2	3,9	10,1
11	117	5,9	5,3	11,2
12	59	7,5	5,6	13,1
13	20	15,4	9,2	24,6
≥14	18	16,1	10,5	26,6
Total	**5591**	**4,1**	**3,5**	**7,7**

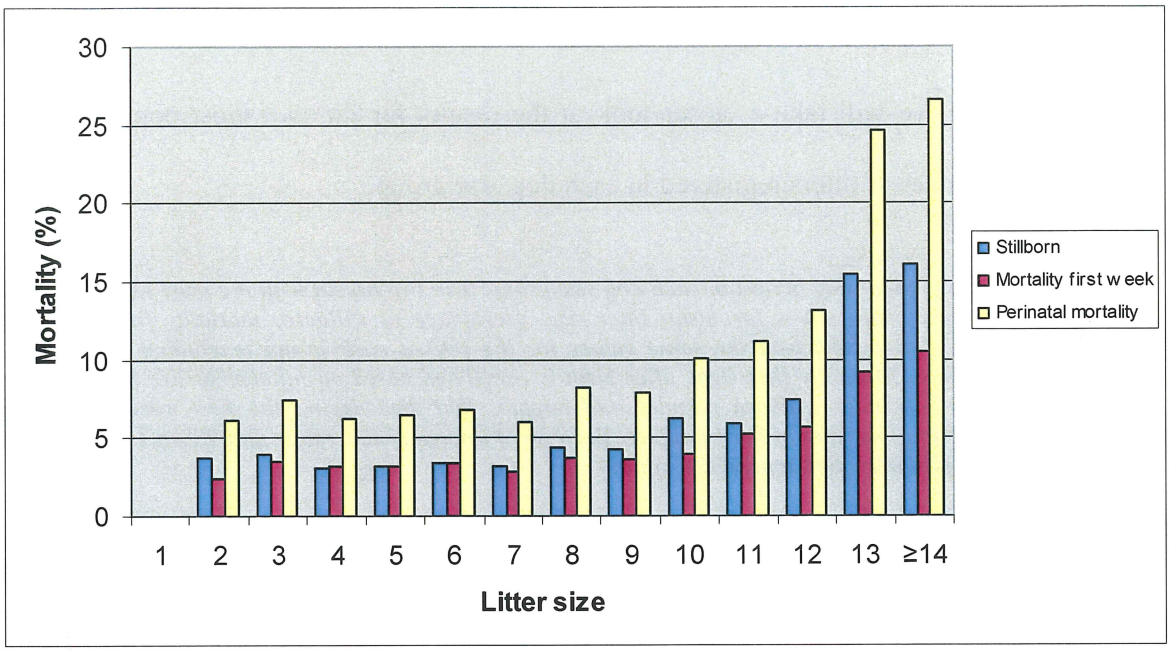

Figure 12. The prevalence of stillbirth, mortality during the first week of life and perinatal mortality in the different dog size groups in relation to litter size. The percentages of stillborn and mortality first week can not be directly added to calculate perinatal mortality. The reason for this is that the percentage of stillborn is calculated from the total number of puppies born, while the percentage mortality first week is calculated from number of live born puppies.

Table 9 and Figure 12 shows that both the number of stillborn puppies and the number of puppies that died within one week post partum increased with litter size. The highest mortality rate was found in litters with >14 puppies (n=18) for all the three parameters of mortality. This group had 16.1% stillborn, 10.5% puppy loss during the first week of life and a total perinatal mortality of 26.6%. Litters with only two puppies (n = 457) had 3.7% stillborn, 2.4% puppy loss during the first week of life and a total perinatal mortality of 6.1%.

A sample of breeds

In the following we will take a closer look at the results for the two most popular breeds according to number of litters registered in each dog size group.

Table 10. The most popular dog breeds in each dog size group. The two breeds with the most registrations in each group are listed with values for mean litter size, prevalence of stillborn, mortality first week and perinatal mortality. For comparison the same values for the rest of each group (excluding the breed in question) is also listed. Mortality first week after birth is calculated based on number of live born puppies. Perinatal mortality includes stillborn puppies and puppies that died during the first week after birth, calculated from the total number of born puppies. Because of limited space, range and 95% CI for the mean values are not included here. See appendix I, table A.

Dog size group	n		Litter size mean		Stillborn %		Mortality first week %		Perinatal mortality %	
	Breed	Rest of dog size group	Breed	Rest of dog size group	Breed	Rest of dog size group	Breed	Rest of dog size group	Breed	Rest of dog size group
Miniature breeds										
Chihuahua	128	669	3.0	3.6	4.5	2.4	4.1	3.8	8.4	6.1
Bichon frise	118	679	4.6	3.3	2.2	2.8	3.2	4.1	5.3	6.7
Small breeds										
Cavalier King Charles Spaniel	245	1303	4.1	4.2	3.1	3.0	2.7	3.9	5.7	6.8
Dachshund	204	1344	5.4	4.0	1.7	3.3	3.9	3.7	5.6	6.9
Medium breeds										
Norwegian Elkhound Grey	214	1170	5.6	5.7	3.8	3.9	3.2	3.4	6.8	7.1
Border Collie	169	1215	5.9	5.6	5.4	3.6	4.0	3.3	9.2	6.8
Large breeds										
German Shepherd Dog	270	1349	6.0	7.0	6.1	5.0	4.0	3.6	9.8	8.4
Golden Retriever	157	1462	7.6	6.8	6.1	5.0	2.1	3.8	8.1	8.6
Giant breeds										
Rottweiler	114	129	7.6	7.4	3.7	6.5	3.7	6.3	7.3	12.3
Newfoundland	28	215	6.5	7.6	3.9	5.3	4.0	5.1	7.7	10.2

The results for the 10 breeds in Table 10 were mostly in line with the study population as a whole. Mean litter size was increasing with increasing dog size and so was the percentage of perinatal mortality. The perinatal mortality in Chihuahua however, appeared higher than the perinatal mortality for the rest of the group of miniature breeds (8.4% versus 6.1%), the same

was true for Border Collie in the group of medium breeds (9.2% versus 6.8%). In Dachshund the prevalence of stillbirth was considerably lower than for the rest of the group of small breeds (1.7% versus 3.3%). Rottweiler had a similar trend when compared to the percentage of perinatal mortality for the group of giant breeds (7.3% versus 12.3%). The average perinatal mortality for giant breeds was 9.9%, and when excluding Rottweiler the average perinatal mortality was 12.3%. As to the mean litter size, Dachshund had a somewhat higher litter size than the rest of the group (5.4 versus 4.0). This was also the case for Bichon frisé (4.6 versus 3.3).

For more complete numbers on litter size and perinatal mortality for the 109 breeds in our study, see tables in appendix I, II and III.

Discussion

Based on 5591 litters registered in the Norwegian Kennel Club (NKC) over a period of 15 months, we have studied litter size and puppy mortality in 109 breeds (Appendix I. Table A). Due to the large size of the database, the numbers and results in our study should be reliable and representative for the Norwegian population of purebred dogs.

The perinatal mortality in our material varies from 0.0% - 27.8% (Appendix I. Table A). The fact that some breeds have a 0% perinatal mortality rate does not necessarily indicate under-reporting. On the contrary this is expected as 85% of the litters in the study have no stillborn puppies and 87% of the litters have no mortality during the first week after birth. A possible source of error for a low perinatal mortality in our study can be that some breeders choose not to report stillborn puppies and early puppy mortality. It must, however, be emphasized that for litters with missing values for perinatal mortality, this was not interpreted as no mortality, but the litters were excluded from the study. As the breeders have to sign the registration forms to confirm the information, false reporting as source of error is probably small. Litters with only stillborn puppies or where all puppies died before weaning are not registered in the NKC database. This might lead to an underestimation of mortality. There might also be sources of errors concerning the grouping of breeds according to dog size. For many of the breeds, it was difficult to find references on bodyweight. FCI breed standards often contain mean or minimum/maximum height at the withers of the breed, but not bodyweight. However, the FCI breed standards were used when this was possible. For the remaining breeds, information on bodyweight was found on other web pages (Appendix IX). As most of the references were from other countries, some breeds may have been given a bodyweight interval which might not be consistent with the Norwegian population of the breed. Therefore,

some breeds may have been placed in a group of larger or smaller dogs than what could have been expected.

There was an overall mean litter size of 5.4 puppies in our study, based on 109 different breeds. Litter size ranged from 1 to 18 puppies. This is quite similar to previous studies. Mean litter size was 4.73 in a study by Tedor et al (17). According to our calculations based on the data of Lyngset et al, the mean litter size for all breeds was 5.6 (15). In the study of Robinson the mean litter size was 5.66 (16).

In our study, 85% of the litters had no stillborn puppies, and 87% of the litters had no mortality during the first week of life. The prevalence of stillborn puppies was 4.1%, which equalled a mean value of 0.2 stillborn puppies per litter (Table 8). When compared to other studies where the stillborn prevalence ranged from 4.6% -10.9% (1, 9, 10, 11, 14), our prevalence was relatively low. The reasons for this might be that our study was based on a large material (n= 5591) and many different breeds (109) (Appendix I Table A). Although some litters had a high perinatal mortality (

Table *6* and Table 7), the effect on the overall mortality rate is small when the material is this large. A study conducted on four large breeds (Leonberger, Newfoundland, Labrador retriever and Irish wolfhound) was conducted by Indrebø et al in 2007 (9). This study also showed that there was a positive significant relationship between litter size and stillbirth. To be able to compare our figures with the study of Indrebø et al we calculated the prevalence of stillbirth for the same four breeds. It was 7.2%, which is lower than the 10.9% found in the study of Indrebø et al (9). Reasons for the lower stillbirth prevalence in our study might be a different dispersion of litters of each breed. Our study also included almost twice as many litters (n=193) as in the study of Indrebø et al (n=98). Therefore, litters with an extremely high rate

of stillbirth probably had a smaller influence on the mean prevalence of stillbirth in the four breeds in our study. The prevalence of live born puppies that died during the first week of life was low in our study, only 3.7% (Table 8). Other studies that have comparable numbers on mortality during the first week are few. Mortality of live born puppies during the first week of life was in one study 5.7% (9). Previous studies indicated that the largest puppy loss occurred during the first week of life (9, 14). But, without considering the size of the dog, more puppies were lost due to stillbirth than during the first week of life in our study. This was in line with a study of Boxers, where stillbirth was the most frequent cause of death until 7 weeks of age (5.5% stillborn) (11). Unfortunately we do not have the registrations to assess puppy mortality rate after the first week of life. We defined perinatal mortality as stillborn puppies and puppies that died during the first week of life. When former studies defined another time perspective for their mortality figures, we needed to do some calculations based on their data to be able to compare them with our own. We found a perinatal mortality of 7.7% (Table 8), which was low compared to previous studies. Other studies showed a perinatal mortality of 31.4% (10), 19.2% (1) and 16 % (9). In addition to our study, a study by Farstad indicated that early puppy mortality was slightly lower in Norway compared to other countries (6). Both the prevalence of stillborn puppies and the prevalence of puppy mortality during the first week of life were lower in this study than in many other studies. One cause of this might be that small-scale breeding is common in Norway. Small kennels can contribute to a lower risk of infections and as most dogs in this study are kept as family dogs, they undergo close monitoring both during pregnancy and during parturition. Further, most litters are raised under good sanitary conditions and surveillance by the breeder. Factors concerning management during pregnancy, for example feeding and exercise, may also be different in our study compared to studies conducted on dogs under laboratory conditions. The occurrence of contagious diseases in Norway is low compared to other countries, for example *Brucella*

canis is not a problem (23). Herpes virus is seldom reported as a confirmed cause of puppy mortality. The ongoing project on canine herpes virus in Norway (2007) will hopefully tell us the importance of this disease (personal announcement, Anette Krogenæs). It is also worth mentioning that many previous studies are old, and improved knowledge about management may have contributed to the low perinatal mortality in our study compared to older studies.

Dog size

Our study showed that the mean litter size increased with increasing weight of the dog, based on our grouping of dogs into five different bodyweight classes ($p<0.05$ for all breed groups, Appendix X, Table F). This is consistent with previous studies (15, 16, 24). The correlation between litter size and dog size in our study was approximately linear. It seems natural that a larger dog can give birth to more puppies. The relative size of the fetus compared to the dam is larger in dams of smaller breeds than in dams of larger breeds. It is important to remember though that our grouping of dogs is based on bodyweight only. Dogs that are anatomically very different can end up in the same bodyweight class. The linear correlation between litter size and dog size must at some point of time level out due to biological reasons such as limited space in the uterus and a limited number of teats. This is not explicit from our results, but has been shown in previous studies (16, 17).

Larger breeds often have large litters, longer duration of births and are therefore prone to inertia (primary and secondary) (9). In our study, increasing dog size was positively correlated to litter size and the occurrence of stillbirth (Figure 10). The positive correlation between dog size and stillbirth was significant also when excluding the interference of a larger litter size by statistical analysis (Appendix X, Table G). Rowlands, however, reported

that the stillbirth rate remained constant independent of breed, but the postnatal death rate in small litters was significantly lower than large litters (14). The fact that Rowlands only studied a few breeds of similar size might be a reason for the constant stillbirth rate he observed.

Further, the larger dog breeds lost more puppies in stillbirth than they did during the first week after birth in our study. However, the giant breeds also had a higher frequency of deaths during the first week of life than all the other dog size groups. This can be explained by a higher risk of a heavy dam to cause trauma to the small and numerous puppies. Even a small incautiousness of the dam can result in lethal trauma to the puppy (9).

The age of the dam and litter number

There was a correlation between age of the dam and litter size in our study ($p<0.05$). The mean litter size increased until the dam was four years old, and the litter size was constant until it declined for dams seven years of age or older. This shows that not only did breeding of old dogs result in smaller litters, as might be expected, but so did breeding of young dogs. In our material there was an overrepresentation of miniature and small breeds amongst the youngest dams. This is expected as small breeds are full-grown and gain sexual maturity earlier than large breeds (25) and might contribute to the low litter size for the youngest dams in our study. It would be likely to assume that smaller breeds would also be overrepresented in litters from dams over seven years of age due to a shorter expected life span in larger than smaller breeds (26, 27, 28). However, the expected overrepresentation of smaller breeds in the highest age group is not present in our material. This supports our finding of age influencing litter size. NKC strongly advice against breeding a bitch in her first heat or after nine years of

age (21). The low number of very young and very old dams in our database indicates that most Norwegian breeders follow these guidelines made by NKC.

In our study, there was a small, but significant positive correlation between stillbirth and age of the dam (Appendix X, Table G). As our study has shown that there is no increase in litter size with age, a larger litter size can not be the cause for the high stillborn prevalence in old dams. The correlation between stillbirth and age of the dam might be explained by an increased risk of complications during birth, for example inertia. According to our study, there was also a considerable increase in perinatal mortality for dams with more than five previous litters (correlation coefficient 1.4, $p<0.05$), although the statistical analysis was corrected for the effect of age (Appendix X Table H). Bowden et al found that perinatal mortality increased with each parturition until the fourth (10). With reference to our findings, both when it comes to aging of the dam and the effect of many former litters, we support NCK's ethical guidelines not to breed bitches older than nine years. There was no correlation between age of the dam and percentage of puppies that died during the first week after birth. In another study it was observed that the number of stillbirths and the postpartum mortality rate increased slightly, but significantly, with increasing age of the dam (14). As to puppy mortality during the first week, management and the mothering skills of the individual dam are probably more important than age of the dam. Other studies have also shown a correlation between age of the dam, litter size and perinatal mortality. A study on the Hungarian shepherd breed, however, showed that young bitches produced larger litters and that the litter size decreased gradually after three years of age (29). In a study done by Thomassen et al, bitches older than six years of age had a lower fertility than young ones. Both the whelping rate and the litter size tended to be smaller. Age-related changes in the uterus might be one of the reasons for this (24).

When evaluating whether litter size was influenced by the number of previous litters of the dam, the confounding factor between litter number and the age of the dam had to be taken into consideration. Our results showed an increasing litter size with increasing litter number. However, statistical analysis showed that the increasing litter size was mainly due to increased age of the dam and that the effect of litter number was insignificant (Appendix X, Table F). This was also the conclusion from the study of Pearson et al in 1931 (18).

Seasonal variations

There was a small seasonal variation in litter size in our material (Table 4, Figure 7). The largest litters were found in March and the smallest in October to December. Rowlands found that litter size was not affected by seasonal influences (14). Another study showed that monthly variations in litter size were almost negligible, but the average litter size was slightly larger in March-August than September-February (17). In a study from the tropics there was a significantly larger litter size in March than in September. Puppy mortality was highest in September (31). In all the studies that found a correlation between litter size and birth month, the mean litter size was largest in the spring. In tropical areas the climate in the summer is likely to affect the oestrus activity, while increasing day length is a possible factor affecting reproductive performance and litter size in bitches in temperate areas like Norway (30). This correlates well with our findings, as the distribution of litters through the year tended to follow the distribution of the mean litter size, with the largest number of litters in March. Tedor found the highest frequency of births in May and the lowest in February. He suggested that the variations might be due to multifactorial interaction of genetic elements, management, climate and other environmental factors (17). Although the distribution of litters through the

year is mainly affected by the time the bitches come into heat, it is also to a certain extent affected by when it is convenient for the breeder to have a litter and raise puppies. For example, it may be more convenient for the breeder to have puppies in the spring and summer when the puppies can be kept more outside.

Method of mating

In our study, there were minor differences in litter size between the different methods of mating (Figure 8). This differs considerably from former studies. Linde-Forsberg et al (1989) found that litter size in dams inseminated with fresh semen was smaller than in dams naturally mated. The use of frozen semen resulted in an even lower estimated litter size (31). A later study by some of the same authors gave the same conclusion (32). The fresh semen was deposited intravaginally, while the frozen semen was deposited transcervically into the uterus. In our study, there was a significant difference in litter size between natural mating and artificial insemination with frozen semen, although minor and probably of little practical importance ($p < 0.05$). Our study gives an expectancy of only 0.19 fewer puppies in litters conceived with frozen semen than by natural mating. In Norway, insemination with frozen semen is deposited transcervically, according to the Norwegian catheter method.

In a study on artificial insemination with frozen semen in dogs over a 10 year-period in Norway, the mean litter size ± SEM was 5.7 ± 0.1 puppies (24). To be able to compare this with our results, we calculated SEM for the mean litter size in litters conceived by frozen semen. In our study, the mean litter size ± SEM for insemination with frozen semen was 5.3 ± 0.4. The difference from Thomassen et al was not statistically significant. Another study from the USA on insemination with fresh semen in bitches showed a mean litter size of 5.6 (no

SEM given), which was also quite similar to ours (5.5) (33). The two studies on artificial insemination also concluded that semen quality was not influencing litter size, only the conception rate (24, 33). As we only had data from registered litters, we could not say anything about the conception rate of the different methods of mating.

A sample of breeds

Chihuahua had a higher perinatal mortality than the rest of the miniature dogs (Table 10). Natural biological variation may account for some of the difference. However, the high perinatal mortality in the Chihuahua may be due several reasons. First, there might be problems with dystocia because of the anatomy of the scull. Further, this breed has recently become extremely popular in Norway as well as many other countries. From 1996-2000 the average number of Chihuahua puppies registered in NKC was 63 per year, while in 2006 a total of 285 Norwegian bred Chihuahuas were registered (21). The popularity of the breed may have lead to an extensive breeding on each individual animal, sometimes without consideration of the age and health status. Probably there is some degree of inbreeding as well. The market's large demand for puppies and the opportunity to make money may encourage many new and inexperienced breeders to produce puppies. This may result in poor management which may be part of the cause of the high prevalence of perinatal mortality in this breed.

The average perinatal mortality for giant breeds was 9.9%, and when excluding Rottweiler the average perinatal mortality was 12.3% revealing the fact that this breed pulled the mortality rate down for the group of the giant breeds. In our study, Rottweiler was categorized as a giant breed due to a high average bodyweight. One may argue that Rottweilers are

anatomically more similar to large breeds and that they might have been grouped differently if other parameters than bodyweight, for instance height, had been used for classification.

Other studies have found high numbers of perinatal mortality for the Boxer as opposed to our study. (Appendix X, Table A) A recent study from Sweden even claimed that the Boxer was one of the high-risk breeds for whelping problems (20). We have therefore commented upon the Boxer results in particular. In our study 2.1% of the Boxer puppies were stillborn. This was quite low when compared to the other studies with a stillborn mortality ranging from 6.1 % (2) - 25.7 % (20). In our study 2.0% of the puppies died during the first week. In Nielen et al's study from the Netherlands the mortality from day 0-7 was 34.8 % (2). The calculation of puppy mortality in Boxer is complicated by the fact that in some countries, 15.5-17.9% of the Boxer puppies with "wrong" coat colour (white) are euthanized (2, 20). According to the Norwegian Boxer Club it is now less common in Norway to euthanize white boxer puppies; this probably explains the low puppy mortality on Boxer in Norway. In our study, the mean litter size for Boxers was 6.7. (Appendix X, Table A) This correlates well with a mean of 6.4 and 6.6 puppies per litter found in other studies (2, 20).

For comparison, we have added a table with some numbers on litter size from our and previous studies. Former studies on litter size of a certain extent were all performed in the 1970s. The differences in mean litter size may be due to biological variation and differences in the composition of the dog population between countries. The dog population has most likely changed in Norway since the study conducted by Lyngset et al. The popularity of the various dog breeds changes over time, and this may affect the mean litter size for the population. However, the mean litter sizes for the different breeds in our study correlate quite well with previous studies (Table 11).

*Table 11. Mean litter size for selected breeds published by different authors. *Breeds in study by Indrebø et al 2007: Irish Wolfhound, Newfoundland, Labrador retriever and Leonberger. Irish Wolfhound is excluded from the rest of our study due to a small number of litters (n<10). It is included here only for the purpose of comparison with the study of Indrebø et al.*

Breed	Mean litter size					
	This study	Robinson 1973	Lyngset 1970	Tedor et al 1978	Nielen et al 1998	Indrebø et al 2007
Beagle	5.3	5.6	5.6	5.01	-	-
Boxer	6.7	6.4	6.85	-	6.4	-
Chihuahua	3.0	-	-	3.37	-	-
Cocker Spaniel	5.7	4.8	4.76	-	-	-
Dachshund	5.6	-	4.46	4.2	-	-
Doberman	6.9	7.6	7.59	6.78	-	-
English setter	6.4	6.3	6.25	-	-	-
German Shepherd	6.0	-	7.96	6.74	-	-
Golden retriever	7.6	8.1	8.12	-	-	-
Irish setter	7.2	7.2	7.17	8.26	-	-
Labrador retriever	6.8	7.8	7.8	-	-	-
Norwegian Elkhound, grey	5.6	6.0	6.00	-	-	-
Pomeranian	2.3	2.0	2.04	2.71	-	-
Rottweiler	7.6	7.5	7.53	-	-	-
St. Bernard	6.9	8.5	8.49	7.15	-	-
4 large breeds*	7.0	-	-	-	-	7.6

Conclusion

In this study a great majority (76%) of the litters had no perinatal mortality. In 85% of the litters there was no stillbirth, while 87% of the litters had no mortality during the first week of life. The perinatal mortality of 7.7% in Norway is low compared to all other studies conducted in different countries. It would be of interest to look into breeds with a high perinatal mortality and the aetiology behind. A new, controlled study could be conducted by interviewing the breeders. Hopefully, our study can be of use and inspiration to further studies on the subject.

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Sammendrag

Tittel: Kullstørrelse og perinatal dødelighet hos renrasede hunder i Norge

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Dette studiet omhandler kullstørrelse og valpedødelighet hos 109 raser. Basert på 5591 valpekull registrert i Norsk Kennel Klub (NKK) i perioden 01.01.2006 til 01.03 2007, ble det funnet en perinatal dødelighet på 7.7%. Av valpene i studiet var 4.1% dødfødte, mens 3.7% døde i løpet av første leveuke. Andelen dødfødte valper steg signifikant med økt alder på tispen og med økt størrelse på hunden. Økt størrelse på hunden og økt kullstørrelse ga en høyere perinatal dødelighet. Flesteparten av kullene (76%) hadde derimot ingen perinatal dødelighet. Den perinatale dødeligheten er lav i Norge sammenlignet med studier utført i andre land.

Gjennomsnittlig kullstørrelse var 5.4 valper. Kullstørrelsen viste en signifikant korrelasjon med hundens størrelse, alder på tispen og tiden på året kullet ble født. Gjennomsnittlig kullstørrelse steg med økt størrelse på hunden. Eldre tisper fikk en nedgang i kullstørrelse på grunn av alder og ikke på grunn av økt kullnummer. For alle raser er det er en liten, men signifikant sesongmessig variasjon i kullstørrelse fra 5.1 til 5.8 valper. De gjennomsnittlig største kullene ble født i mars, mens de minste ble født i oktober til desember. Naturlig paring ga en minimal, men signifikant økning i kullstørrelse på 0.19 valper, sammenlignet med kunstig inseminasjon med frossen sæd utført i henhold til den norske metoden.

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Appendix IX

Table E. The breeds in the different dog size groups

Breed	n	Lower bodyweight limit (kg)	Upper bodyweight limit (kg)	Mean of the bodyweight interval (kg)	Reference
Miniature breeds					
Bichon frise	118	3	5	4	http://www.dogbreedinfo.com/bichonfrise.htm
Chihuahua	128	1.5	3	2.25	http://www.fci.be/uploaded_files/218gb04_en.doc
Chinese Crested Dog (incl. Powder Puff)	75	2.3	5.4	3.9	http://www.5stardog.com/dog-breeds-chinese-crested.asp
Dachshund (Miniature)	85			3.5	http://www.dogbreedinfo.com/dachshund.htm
Dachshund (Rabbit)	17			4	http://en.wikipedia.org/wiki/Dachshund
Havanese	30	3	6	4	http://www.dogbreedinfo.com/havanese.htm
Italian Greyhound	22	3	5	4	http://en.wikipedia.org/wiki/Italian_Greyhound
Japanese Chin	13	2	3	2.5	http://www.breederretriever.com/dog-breeds/162/japanese-chin.php
Papillon	99	1.5	5	3.3	http://www.breederretriever.com/dog-breeds/162/japanese-chin.php
Pekingese	10	3	6	4.5	http://en.wikipedia.org/wiki/Pekingese
Phalene	21	1.2	5	3.1	http://www.fci.be/nomenclatures_detail.asp?lang=en&I=E&file=group9&name=Epagneul+nain+Continental
Pomeranian	95	1.4	3.2	2.3	http://en.wikipedia.org/wiki/Pomeranian_(dog)
Poodle (Toy)	63	3	4	3.5	http://www.dogbreedinfo.com/toypoodle.htm
Yorkshire Terrier	21	2.5	3.5	3	http://en.wikipedia.org/wiki/Yorkshire_Terrier
Small breeds					
Australian Terrier	15	4	6	5	http://www.dogbreedinfo.com/australianterrier.htm
Border Terrier	12	5.1	7.9	6.5	http://www.fci.be/uploaded_files/010gb98_en.doc
Boston Terrier	26	4.5	11.3	7.9	http://www.dogbreedinfo.com/bostonterrier.htm
Cairn Terrier	98	6	7.5	6.75	http://www.fci.be/uploaded_files/004gb98_en.doc
Cavalier King Charles Spaniel	245	5.8	8	6.9	http://www.fci.be/uploaded_files/136gb98_en.doc
Coton de Tuléar	18	5.5	7	6.3	http://www.dogbreedinfo.com/cotondetulear.htm
Dachshund	204	5	14	9.5	http://www.5stardog.com/dog-breeds-dachshund.asp
Fox Terrier (Smooth)	10	6.8	8.2	7.5	http://www.fci.be/uploaded_files/012A2003_en.doc
French Bulldog	20	7	12.5	9.8	http://en.wikipedia.org/wiki/French_Bulldog
Jack Russell Terrier	67	6	8	7	http://www.dogbreedinfo.com/jackrussellterrier.htm
Japanese Spitz	57	7	9	8	http://en.wikipedia.org/wiki/Japanese_Spitz
Lhasa Apso	16	5.4	6.3	5.9	http://en.wikipedia.org/wiki/Lhasa_Apso
Manchester Terrier	12	5.4	10	7.7	http://en.wikipedia.org/wiki/Manchester_Terrier
Miniature Pinscher	38	4	6	5	http://www.fci.be/uploaded_files/185A2007_en.doc
Miniature Schnauzer	107	4	8	6	http://www.fci.be/uploaded_files/183A2007_en.doc
Norfolk Terrier	17	5	5.4	5.2	http://www.thebreedsofdogs.com/NORFOLK_TERRIER.htm
Norwegian Lundehund	26	6	7	6.5	http://www.fci.be/uploaded_files/265gb99_en.doc
Poodle (Miniature)	81	7	8	7.5	http://www.dogbreedinfo.com/miniaturepoodle.htm
Pug	54	6.3	8.1	7.2	http://de.wikipedia.org/wiki/Mops_(Hund)
Shetland Sheepdog	164	5	10	7.5	http://no.wikipedia.org/wiki/Shetland_sheepdog
Shih Tzu	57	4.5	8.1	6.3	http://www.fci.be/uploaded_files/208gb98_en.doc
Tibetan Spaniel	185	4.1	6.8	5.45	http://www.fci.be/uploaded_files/231gb98_en.doc
West Highland White Terrier	19	7.5	10	8.8	http://en.wikipedia.org/wiki/West_Highland_White_Terrier

Appendix IX

Table E. The breeds in the different dog size groups

Breed	n	Lower bodyweight limit (kg)	Upper bodyweight limit (kg)	Mean of the bodyweight interval (kg)	Reference
Medium breeds					
Airedale Terrier	11	20	25	22.5	http://no.wikipedia.org/wiki/Airedaleterrier
American Cocker Spaniel	51	7	14	10.5	http://www.dogbreedinfo.com/americancocker.htm
Australian Shepherd	12	18	29	23.5	http://www.dogbreedinfo.com/australianshepherd.htm
Basenji	20	9	12	10.5	http://www.dogbreedinfo.com/basenji.htm
Basset Hound	10	20	29	24.5	http://www.dogbreedinfo.com/bassethound.htm
Beagle	68	9	11	10	http://www.dogbreedinfo.com/beagle.htm
Bearded Collie	11	18	22	22.5	http://www.dogbreedinfo.com/beardedcollie.htm
Border Collie	169	13	22	17.5	http://www.dogbreedinfo.com/doguedebordeax.htm
Brittany	30	15	20	17.5	http://de.wikipedia.org/wiki/Epagneul_Breton
Bulldog	22	23	25	24	http://www.fci.be/uploaded_files/149GB2004_en.doc
Cocker Spaniel	93	12.5	14.5	13.5	http://www.fci.be/uploaded_files/005A2003_en.doc
Danish-Swedish Farm Dog	18	10	13	11.5	http://no.wikipedia.org/wiki/Dansk-svensk_g%C3%A5rdshund
English Springer Spaniel	42	18	25	21.5	http://www.dogbreedinfo.com/englishspringerspaniel.htm
Finnish Hound	40	20	25	22.5	http://www.dogbreedinfo.com/finnishhound.htm
Finnish Lapphund	11	15	24	19.5	http://en.wikipedia.org/wiki/Finnish_Lapphund
Finnish Spitz	10	7	13	10	http://www.fci.be/uploaded_files/049gb99_en.doc
Hamilton Hound	16	22.5	27	24.8	http://www.digitaldog.com/dog_breed/Hamiltonstovare
Icelandic Sheepdog	15	9	14	11.5	http://www.dogbreedinfo.com/icelandicsheepdog.htm
Lagotto Romagnolo	13	11	16	13.5	http://en.wikipedia.org/wiki/Lagotto_Romagnolo#Size
Norwegian Buhund	21	12	18	15	http://www.fci.be/uploaded_files/237GB99_en.doc
Norwegian Elkhound (Black)	33	18.1	20	19.1	http://www.continentalkennelclub.com/Ads.aspx?BreedNum=601
Norwegian Elkhound (Grey)	214	15	25	20	http://no.wikipedia.org/wiki/Norsk_elghund_gr%C3%A5
Norwegian Hound (Dunker)	26	16	20	18	http://ezinearticles.com/?The-Dunker-Hound,-A-Rare-Breed-of-Norway&id=198032
Nova Scotia Duck Tolling Retriever	38	17	23	20	http://www.fci.be/uploaded_files/312gb99_en.doc
Petit Basset Griffon Vendéen	21	15	20	18	http://en.wikipedia.org/wiki/Petit_Basset_Griffon_Vendeen
Poodle (Medium)	61	7	15	11	http://no.wikipedia.org/wiki/Puddel
Samoyed	17	17	23	20	http://no.wikipedia.org/wiki/Samojedhund
Schnauzer	19	14	19	17	http://www.fci.be/uploaded_files/182A2007_en.doc
Shiba Inu	23	7	13	10	http://de.wikipedia.org/wiki/Shiba-Inu
Siberian Husky	42	15.5	28	21.75	http://www.fci.be/uploaded_files/270gb2000_en.doc
Small Munsterlander	13			20	http://en.wikipedia.org/wiki/Small_M%C3%BCnsterl%C3%A4nder
Soft Coated Wheaten Terrier	34	13.5	18	15.8	http://en.wikipedia.org/wiki/Soft-Coated_Wheaten_Terrier
Staffordshire Bull Terrier	36	11	17	14	http://www.fci.be/uploaded_files/076gb98_en.doc
Swedish Dachsbracke (Drever)	54	14	16	15	http://www.dogbreedinfo.com/drever.htm
Swedish Lapphund	15	15	20	17.5	http://no.wikipedia.org/wiki/Lapphund
Tibetan Terrier	17	8	14	11	http://en.wikipedia.org/wiki/Tibetan_Terrier
Welsh Corgi (Pembroke)	13	10	12	11	http://www.fci.be/nomenclatures_detail.asp?lang=en&file=group1
Whippet	25	9	13	11	http://en.wikipedia.org/wiki/Whippet

Appendix IX

Table E. The breeds in the different dog size groups

Breed	n	Lower bodyweight limit (kg)	Upper bodyweight limit (kg)	Mean of the bodyweight interval (kg)	Reference
Large breeds					
Alaskan Malamute	27	30	45	37.5	http://no.wikipedia.org/wiki/Alaskan_malamute
Groenendael	17	20	30	25	http://en.wikipedia.org/wiki/Groenendael#Size
Tervueren	26	28	35	31.5	http://no.wikipedia.org/wiki/Tervueren
Bernese Mountain Dog	84	36	50	43	http://www.dogbreedinfo.com/bernesemountain.htm
Boxer	70	25	32	28.5	http://en.wikipedia.org/wiki/Boxer_%28dog%29#Size
Bull Terrier	20	20	36	28	http://www.dogbreedinfo.com/bullterrier.htm
Chow Chow	22	20	32	26	http://www.dogbreedinfo.com/chowchow.htm
Dalmatian	29	24	32	28	http://www.fci.be/uploaded_files/153gb99_en.doc
Dobermann	26	32	45	28.5	http://www.fci.be/uploaded_files/143GB2003_en.doc
English Setter	128	20	36	28	http://www.dogbreedinfo.com/englishsetter.htm
Eurasier	13	18	32	25	http://www.fci.be/uploaded_files/291gb99_en.doc
Flat Coated Retriever	80	25	36	30.5	http://en.wikipedia.org/wiki/Flat_Coated_Retriever_
German Shepherd Dog	270	22	40	31	http://de.wikipedia.org/wiki/Deutscher_Sch%C3%A4ferhund
German Shorthaired Pointer	31	20	30	25	http://no.wikipedia.org/wiki/Vorstehhund_korth%C3%A5ret
German Wirehaired Pointer	28	25	30	27.5	http://de.wikipedia.org/wiki/Deutsch_Drahthaar
Giant Schnauzer	21	35	46	40.5	http://www.fci.be/nomenclatures_detail.asp?lang=en&I=R&file=group2&name=Riesenschnauzer
Golden Retriever	157	27	34	30.5	http://en.wikipedia.org/wiki/Golden_Retriever#Size
Gordon Setter	124	25.5	29.5	27.5	http://www.fci.be/uploaded_files/006gb98_en.doc
Greenland Dog	19	30	32	36	http://www.dogbreedinfo.com/greenlanddog.htm
Irish Setter	77	24	32	28	http://en.wikipedia.org/wiki/Irish_Setter
Labrador Retriever	134	27	36	31.5	http://en.wikipedia.org/wiki/Labrador_Retriever
Pointer	51	20	31	25	http://no.wikipedia.org/wiki/Pointer
Poodle (Standard)	56	20	32	26	http://www.dogbreedinfo.com/standardpoodle.htm
Rhodesian Ridgeback	17	32	36.5	34.25	http://www.fci.be/uploaded_files/146gb2001_en.doc
Rough Collie	61	23	34	28.5	http://www.dogbreedinfo.com/collie.htm
Swedish Elkhound (Jämthund)	31			30	http://www.continentalkennelclub.com/Ads.aspx?BreedNum=2119
Giant breeds					
Dogo Canario	11	40	59	49.5	http://en.wikipedia.org/wiki/Perro_de_Presa_Canario
Dogue de Bordeaux	13	54.4	65.2	59.8	http://www.dogbreedinfo.com/doguedebordeax.htm
Great Dane	19	45	90	67.5	http://www.dogbreedinfo.com/greatdane.htm
Leonberger	23	45	77	61	http://www.dogbreedinfo.com/leonberger.htm
Newfoundland	28	54	68	61	http://www.fci.be/nomenclatures_detail.asp?lang=en&I=N&file=group2&name=Newfoundland
Pyrenean Mountain Dog	10	40	70	55	http://no.wikipedia.org/wiki/Pyreneerhund
Rottweiler	114	42	50	46	http://www.fci.be/nomenclatures_detail.asp?lang=en&I=R&file=group2&name=Rottweiler
St. Bernard	25	55	100	77.5	http://no.wikipedia.org/wiki/Sankt_bernhardshund

Appendix X

Multivariable statistical analysis

Table F. Litter size. Results from linear regression analysis

Explanatory variable	Litter size			
	Coefficient	[95% CI]		p-value
		Lower	Upper	
Method of mating				
Natural mating	0	0	0	0
A.I. fresh semen	-0.046	-0.11	0.02	0.17
A.I. frozen semen	-0.20	-0.34	-0.053	0.007
Dog size group				
Miniature breeds	0	0	0	0
Small breeds	0.18	0.015	0.35	0.033
Medium breeds	0.49	0.33	0.66	0
Large breeds	0.69	0.52	0.85	0
Giant breeds	0.76	0.60	0.93	0
Age of dam				
Age of dam	0.045	0.013	0.078	0.006
Age of dam, squared	-0.0067	-0.0099	-0.0036	0

Table G. Stillborn. Results from zero-inflated Poisson regression analysis, first part of model representing the poisson part, the second the inflation (logistic) part of model

Explanatory variable	Stillborn IRR	[95% CI] Lower	Upper	p-value
Poisson part, IRR				
Dog size group				
Miniature breeds	1.0	1.0	1.0	1.0
Small breeds	1.1	0.8	1.5	0.6
Medium breeds	1.3	0.94	1.7	0.13
Large breeds	1.5	1.2	2.01	0.003
Giant breeds	1.8	1.3	2.6	0.001
Age of dam				
Age of dam	0.91	0.75	1.1	0.29
Age of dam, squared	1.0	1.00	1.04	0.017
Inflation part				
Method of mating				
Natural mating	0	0	0	0
A.I. fresh semen	-1.2	-1.9	-0.53	0.00
A.I. frozen semen	-1.2	-2.3	-0.04	0.043
Litter number				
Litter number 1	0	0	0	0
Litter number 2	-0.062	-0.31	0.19	0.63
Litter number 3	0.55	0.21	0.88	0.001
Litter number 4	0.66	0.21	1.1	0.004
Litter number 5	0.41	-0.23	1.0	0.21
Litter number >5	1.0	-0.16	2.2	0.091

Table H. Perinatal mortality. Results from zero-inflated Poisson regression analysis, first part of model representing the poisson part, the second the inflation (logistic) part of model

	Perinatal mortality			
Explanatory variable	**IRR**	**[95% CI]**		**p-value**
		Lower	**Upper**	
Dog size group				
Miniature breeds	1	1	1	1
Small breeds	1.0	0.84	1.25	0.84
Medium breeds	0.98	0.8	1.2	0.84
Large breeds	1.1	0.92	1.4	0.26
Giant breeds	1.4	1.1	1.8	0.003
Age of dam				
Age of dam	0.91	0.8	1.03	0.13
Age of dam, squared	1.0	1.01	1.03	0.001
	Inflation part			
	Coefficient			
Method of mating				
Natural mating	0	0	0	0
A.I. fresh semen	-1.1	-1.8	-0.52	0
A.I. frozen semen	-0.9	-1.2	0.13	0.085
Litter number				
Litter number 1	0	0	0	0
Litter number 2	0.086	-0.13	0.3	0.44
Litter number 3	0.41	0.14	0.69	0.003
Litter number 4	0.49	0.12	0.85	0.009
Litter number 5	0.46	-0.068	0.99	0.088
Litter number >5	1.4	0.4	2.4	0.006

Appendix I.

Table A. Litter size and perinatal mortality, all breeds

Breed	Litters	Littersize				Stillborn per litter					Mortality during the 1.week after birth*					Perinatal mortality **				
	n	Range	Mean	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper
Airedale Terrier	11	1.0-15.0	7.3	5.76	9.05	0.0-4.0	0.5	7.5	0.2	1.19	0.0-2.0	0.2	2.7	0.02	0.66	0.0-4.0	0.7	10	0.31	1.43
Alaskan Malamute	27	1.0-11.0	6.4	5.52	7.48	0.0-3.0	0.4	5.7	0.18	0.68	0.0-1.0	0.1	1.2	0.01	0.27	0.0-3.0	0.4	6.9	0.23	0.78
American Cocker Spaniel	51	1.0-8.0	5.1	4.46	5.72	0.0-2.0	0.1	1.9	0.03	0.23	0.0-2.0	0.1	1.6	0.02	0.2	0.0-2.0	0.2	3.5	0.08	0.34
Australian Shepherd	12	1.0-13.0	8.9	7.31	10.78	0.0-1.0	0.2	1.9	0.02	0.6	0.0-1.0	0.2	1.9	0.02	0.6	0.0-2.0	0.3	3.7	0.09	0.85
Australian Terrier	15	1.0-8.0	5.3	4.23	6.64	0.0-0.0	0	0	0	0.25	0.0-2.0	0.3	5	0.07	0.68	0.0-2.0	0.3	5	0.07	0.68
Basenji	20	1.0-8.0	4.8	3.89	5.86	0.0-0.0	0	0	0	0.18	0.0-0.0	0	0	0	0.18	0.0-0.0	0	0	0	0.18
Basset Hound	10	1.0-9.0	5.3	3.97	6.93	0.0-0.0	0	0	0	0.37	0.0-1.0	0.1	1.9	0	0.56	0.0-1.0	0.1	1.9	0	0.56
Beagle	68	1.0-10.0	5.3	4.75	5.86	0.0-5.0	0.3	4.7	0.15	0.4	0.0-2.0	0.2	3.2	0.08	0.29	0.0-5.0	0.4	7.8	0.27	0.6
Bearded Collie	11	1.0-9.0	5.6	4.32	7.23	0.0-2.0	0.5	9.7	0.2	1.19	0.0-2.0	0.3	5.4	0.06	0.8	0.0-4.0	0.8	14.5	0.37	1.55
Bernese Mountain Dog	84	1.0-15.0	6.6	6.05	7.16	0.0-8.0	0.5	7.2	0.34	0.65	0.0-9.0	0.2	3.3	0.12	0.32	0.0-9.0	0.7	10.3	0.51	0.88
Bichon Frise	118	1.0-9.0	4.6	4.24	5.02	0.0-2.0	0.1	2.2	0.05	0.18	0.0-5.0	0.1	3.2	0.08	0.23	0.0-7.0	0.2	5.3	0.17	0.35
Border Collie	169	1.0-13.0	5.9	5.59	6.33	0.0-4.0	0.3	5.4	0.24	0.42	0.0-5.0	0.2	4	0.16	0.31	0.0-6.0	0.5	9.2	0.44	0.67
Border Terrier	12	1.0-9.0	6	4.7	7.56	0.0-1.0	0.2	2.8	0.02	0.6	0.0-1.0	0.1	1.4	0	0.46	0.0-1.0	0.3	4.2	0.05	0.73
Boston Terrier	26	1.0-8.0	3.9	3.16	4.72	0.0-2.0	0.2	5.9	0.09	0.5	0.0-2.0	0.2	6.3	0.09	0.5	0.0-3.0	0.5	11.9	0.24	0.81
Boxer	70	1.0-12.0	6.7	6.14	7.37	0.0-2.0	0.1	2.1	0.07	0.26	0.0-4.0	0.1	2	0.06	0.24	0.0-4.0	0.3	4	0.16	0.42
Brittany	30	1.0-10.0	6.7	5.78	7.66	0.0-1.0	0.1	1.5	0.02	0.29	0.0-3.0	0.2	3	0.07	0.44	0.0-3.0	0.3	4.5	0.14	0.57
Bull Terrier	20	1.0-9.0	5.7	4.7	6.85	0.0-1.0	0.2	2.6	0.03	0.44	0.0-2.0	0.2	2.7	0.03	0.44	0.0-3.0	0.3	5.3	0.11	0.65
Bulldog	22	1.0-10.0	5.3	4.36	6.32	0.0-3.0	0.1	2.6	0.03	0.4	0.0-3.0	0.4	8	0.19	0.78	0.0-6.0	0.5	10.3	0.28	0.95
Cairn Terrier	98	1.0-8.0	4.4	4	4.84	0.0-3.0	0.2	3.9	0.1	0.28	0.0-1.0	0.1	1.9	0.04	0.16	0.0-3.0	0.3	5.8	0.17	0.38
Cavalier King Charles Spaniel	245	1.0-14.0	4.1	3.84	4.35	0.0-7.0	0.1	3.1	0.09	0.18	0.0-4.0	0.1	2.7	0.07	0.16	0.0-7.0	0.2	5.7	0.18	0.3
Chihuahua	128	1.0-6.0	3	2.67	3.28	0.0-2.0	0.1	4.5	0.08	0.21	0.0-2.0	0.1	4.1	0.07	0.19	0.0-2.0	0.3	8.4	0.17	0.35
Chinese Crested Dog (inkl. powder puff)	75	1.0-9.0	4.5	3.99	4.96	0.0-2.0	0.1	3	0.06	0.25	0.0-3.0	0.3	6.8	0.18	0.44	0.0-3.0	0.4	9.6	0.29	0.6
Chow Chow	22	1.0-7.0	4	3.25	4.98	0.0-4.0	0.5	12.4	0.25	0.9	0.0-1.0	0.1	3.8	0.03	0.4	0.0-4.0	0.6	15.7	0.35	1.07
Cocker Spaniel	93	1.0-10.0	5.7	5.18	6.16	0.0-2.0	0.1	1.7	0.04	0.18	0.0-5.0	0.3	5.8	0.22	0.46	0.0-6.0	0.4	7.4	0.3	0.57
Coton De Tulear	18	1.0-6.0	3.7	2.89	4.73	0.0-2.0	0.1	3	0.01	0.4	0.0-0.0	0	0	0	0.21	0.0-2.0	0.1	3	0.01	0.4
Dachshund	204	1.0-13.0	5.4	5.07	5.71	0.0-2.0	0.1	1.7	0.06	0.15	0.0-5.0	0.2	3.9	0.15	0.28	0.0-7.0	0.3	5.6	0.23	0.38
Dachshund (Miniature)	85	1.0-8.0	4.5	4.07	4.98	0.0-3.0	0.1	3.1	0.07	0.25	0.0-3.0	0.1	2.7	0.06	0.22	0.0-4.0	0.3	5.7	0.16	0.39
Dachshund (Rabbit)	17	1.0-6.0	3	2.23	3.94	0.0-0.0	0	0	0	0.22	0.0-1.0	0.2	5.9	0.04	0.52	0.0-1.0	0.2	5.9	0.04	0.52
Dalmatian	29	1.0-15.0	8.2	7.23	9.36	0.0-4.0	0.8	9.6	0.5	1.19	0.0-4.0	0.8	10.2	0.48	1.15	0.0-8.0	1.6	18.8	1.13	2.08

Appendix I.

Table A. Litter size and perinatal mortality, all breeds

Breed	Litters	Littersize				Stillborn per litter					Mortality during the 1.week after birth*					Perinatal mortality **				
	n	Range	Mean	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper
Danish-Swedish Farm Dog	18	1.0-8.0	4.3	3.38	5.35	0.0-0.0	0	0	0	0.21	0.0-0.0	0	0	0	0.21	0.0-0.0	0	0	0	0.21
Dobermann	26	1.0-11.0	6.9	5.95	8.01	0.0-2.0	0.2	3.3	0.09	0.5	0.0-2.0	0.4	5.7	0.18	0.71	0.0-2.0	0.6	8.9	0.35	1
Dogo Canario	11	1.0-16.0	8.5	6.82	10.36	0.0-2.0	0.2	2.2	0.02	0.66	0.0-2.0	0.2	2.2	0.02	0.66	0.0-4.0	0.4	4.3	0.1	0.93
Dogue de Bordeaux	13	1.0-17.0	8.3	6.82	10.03	0.0-4.0	1.4	16.7	0.82	2.19	0.0-4.0	0.9	13.3	0.48	1.61	0.0-8.0	2.3	27.8	1.56	3.29
English Setter	128	1.0-12.0	6.4	5.98	6.86	0.0-2.0	0.2	2.4	0.1	0.24	0.0-3.0	0.2	3.4	0.14	0.31	0.0-4.0	0.4	5.7	0.27	0.49
English Springer Spaniel	42	1.0-11.0	7	6.18	7.8	0.0-2.0	0.3	4.8	0.18	0.56	0.0-2.0	0.2	2.5	0.07	0.34	0.0-3.0	0.5	7.2	0.31	0.76
Eurasier	13	1.0-10.0	6.1	4.81	7.57	0.0-3.0	0.2	3.8	0.05	0.67	0.0-0.0	0	0	0	0.28	0.0-3.0	0.2	3.8	0.05	0.67
Finnish Hound	40	1.0-13.0	7.2	6.35	8.03	0.0-3.0	0.4	5.9	0.25	0.68	0.0-8.0	0.4	5.2	0.19	0.59	0.0-8.0	0.8	10.8	0.53	1.1
Finnish Lapphund	11	1.0-9.0	5.5	4.16	7.02	0.0-1.0	0.2	3.3	0.02	0.66	0.0-1.0	0.1	1.7	0	0.51	0.0-1.0	0.3	5	0.06	0.8
Finnish Spitz	10	1.0-6.0	3.6	2.52	4.98	0.0-3.0	0.5	13.9	0.16	1.17	0.0-1.0	0.2	6.5	0.02	0.72	0.0-3.0	0.7	19.4	0.28	1.44
Flat Coated Retriever	80	1.0-14.0	8.4	7.75	9.03	0.0-5.0	0.4	4.5	0.25	0.54	0.0-3.0	0.3	3.6	0.18	0.43	0.0-5.0	0.7	7.9	0.5	0.87
Fox Terrier (Smooth)	10	1.0-6.0	4.6	3.37	6.14	0.0-1.0	0.2	4.3	0.02	0.72	0.0-2.0	0.4	9.1	0.11	1.02	0.0-2.0	0.6	13	0.22	1.31
French Bulldog	20	1.0-8.0	4.8	3.89	5.86	0.0-1.0	0.2	3.1	0.03	0.44	0.0-2.0	0.4	7.5	0.14	0.72	0.0-3.0	0.5	10.4	0.24	0.92
German Shepherd Dog	270	1.0-14.0	6	5.74	6.33	0.0-4.0	0.4	6.1	0.3	0.45	0.0-6.0	0.2	4	0.17	0.29	0.0-6.0	0.6	9.8	0.5	0.69
German Shorthaired Pointer	31	1.0-14.0	8	7.07	9.09	0.0-4.0	0.5	6.8	0.32	0.88	0.0-2.0	0.4	4.7	0.18	0.64	0.0-5.0	0.9	11.2	0.6	1.31
German Wirehaired Pointer	28	1.0-12.0	7.1	6.19	8.2	0.0-5.0	0.3	4.5	0.15	0.61	0.0-4.0	0.3	3.7	0.1	0.52	0.0-5.0	0.6	8	0.33	0.93
Giant Schnauzer	21	1.0-14.0	7	5.87	8.18	0.0-2.0	0.1	2.1	0.03	0.42	0.0-1.0	0	0.7	0	0.27	0.0-2.0	0.2	2.7	0.05	0.49
Golden Retriever	157	1.0-13.0	7.6	7.15	8.02	0.0-4.0	0.5	6.1	0.36	0.59	0.0-4.0	0.1	2.1	0.09	0.22	0.0-4.0	0.6	8.1	0.5	0.75
Gordon Setter	124	1.0-13.0	7.4	6.95	7.92	0.0-5.0	0.3	4.3	0.23	0.44	0.0-10.0	0.2	3.3	0.16	0.34	0.0-10.0	0.6	7.5	0.43	0.7
Great Dane	19	1.0-12.0	7.5	6.3	8.81	0.0-3.0	0.6	8.5	0.33	1.1	0.0-2.0	0.4	5.4	0.15	0.76	0.0-3.0	1	13.4	0.6	1.56
Greenland Dog	19	1.0-8.0	5.5	4.47	6.63	0.0-1.0	0.1	1.9	0.01	0.38	0.0-4.0	0.9	16.7	0.52	1.43	0.0-4.0	1	18.3	0.6	1.56
Groenendael	17	1.0-11.0	6	4.89	7.28	0.0-1.0	0.1	1	0	0.33	0.0-6.0	0.4	5.9	0.13	0.77	0.0-7.0	0.4	6.9	0.17	0.85
Hamilton Hound	16	1.0-11.0	6.5	5.31	7.88	0.0-1.0	0.2	2.9	0.04	0.55	0.0-2.0	0.3	4	0.07	0.64	0.0-3.0	0.4	6.7	0.18	0.9
Havanese	30	1.0-9.0	4.3	3.62	5.15	0.0-1.0	0	0.8	0	0.19	0.0-1.0	0.1	2.3	0.02	0.29	0.0-2.0	0.1	3.1	0.04	0.34
Icelandic Sheepdog	15	1.0-6.0	4.4	3.4	5.6	0.0-3.0	0.3	6.1	0.07	0.68	0.0-2.0	0.3	6.5	0.07	0.68	0.0-3.0	0.5	12.1	0.23	1.05
Irish Setter	77	1.0-12.0	7.2	6.65	7.86	0.0-5.0	0.2	2.5	0.1	0.31	0.0-2.0	0.1	2	0.07	0.26	0.0-5.0	0.3	4.5	0.21	0.48
Italian Greyhound	22	1.0-6.0	3.3	2.6	4.17	0.0-0.0	0	0	0	0.17	0.0-1.0	0	1.4	0	0.25	0.0-1.0	0	1.4	0	0.25
Jack Russell Terrier	67	1.0-8.0	4.4	3.9	4.92	0.0-1.0	0	1	0.01	0.13	0.0-2.0	0.1	1.7	0.02	0.17	0.0-2.0	0.1	2.7	0.05	0.24

Appendix I.

Table A. Litter size and perinatal mortality, all breeds

Breed	Litters	Littersize				Stillborn per litter					Mortality during the 1.week after birth*					Perinatal mortality **				
	n	Range	Mean	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper
Japanese Chin	13	1.0-3.0	1.7	1.06	2.56	0.0-1.0	0.1	4.5	0	0.43	0.0-0.0	0	0	0	0.28	0.0-1.0	0.1	4.5	0	0.43
Japanese Spitz	57	1.0-6.0	3.8	3.3	4.33	0.0-2.0	0.1	1.9	0.02	0.18	0.0-1.0	0	0.5	0	0.1	0.0-2.0	0.1	2.3	0.03	0.21
Labrador Retriever	134	1.0-12.0	6.8	6.39	7.29	0.0-7.0	0.6	8.4	0.45	0.72	0.0-4.0	0.2	3.8	0.16	0.34	0.0-8.0	0.8	11.9	0.67	0.98
Lagotto Romagnolo	13	1.0-12.0	6.7	5.36	8.26	0.0-1.0	0.1	1.1	0	0.43	0.0-2.0	0.2	2.3	0.02	0.56	0.0-3.0	0.2	3.4	0.05	0.67
Leonberger	23	1.0-15.0	8.3	7.21	9.62	0.0-3.0	0.4	4.7	0.18	0.74	0.0-2.0	0.6	7.1	0.3	0.97	0.0-4.0	1	11.5	0.6	1.45
Lhasa Apso	16	1.0-9.0	5.5	4.41	6.78	0.0-2.0	0.3	4.5	0.07	0.64	0.0-1.0	0.1	2.4	0.02	0.45	0.0-2.0	0.4	6.8	0.14	0.82
Manchester Terrier	12	1.0-7.0	4.5	3.38	5.87	0.0-0.0	0	0	0	0.31	0.0-1.0	0.2	3.7	0.02	0.6	0.0-1.0	0.2	3.7	0.02	0.6
Miniature Pinscher	38	1.0-7.0	4.3	3.63	4.97	0.0-1.0	0.1	1.2	0.01	0.19	0.0-1.0	0	0.6	0	0.15	0.0-1.0	0.1	1.9	0.02	0.23
Miniature Schnauzer	107	1.0-10.0	4.6	4.24	5.06	0.0-7.0	0.2	3.6	0.1	0.27	0.0-3.0	0.2	3.6	0.09	0.25	0.0-7.0	0.3	7.1	0.23	0.46
Newfoundland	28	1.0-12.0	6.5	5.56	7.48	0.0-2.0	0.3	3.9	0.1	0.52	0.0-3.0	0.3	4	0.1	0.52	0.0-3.0	0.5	7.7	0.27	0.84
Norfolk Terrier	17	1.0-5.0	2.4	1.73	3.27	0.0-1.0	0.1	2.4	0	0.33	0.0-1.0	0.1	2.5	0	0.33	0.0-1.0	0.1	4.9	0.01	0.43
Norwegian Buhund	21	1.0-8.0	4.9	4	5.95	0.0-1.0	0.1	1.9	0.01	0.34	0.0-2.0	0.2	4	0.05	0.49	0.0-2.0	0.3	5.8	0.11	0.62
Norwegian Elkhound (Black)	33	1.0-11.0	5.1	4.38	5.95	0.0-2.0	0.3	5.9	0.15	0.56	0.0-3.0	0.3	5.7	0.13	0.52	0.0-3.0	0.6	11.2	0.35	0.9
Norwegian Elkhound (Grey)	214	1.0-11.0	5.6	5.29	5.92	0.0-4.0	0.2	3.8	0.15	0.28	0.0-4.0	0.2	3.2	0.12	0.24	0.0-4.0	0.4	6.8	0.31	0.48
Norwegian Hound (Dunker)	26	1.0-14.0	7.2	6.16	8.26	0.0-4.0	0.5	6.5	0.24	0.81	0.0-4.0	0.3	4	0.11	0.56	0.0-8.0	0.7	10.2	0.44	1.14
Norwegian Lundehund	26	1.0-5.0	3.1	2.47	3.87	0.0-2.0	0.2	6.2	0.06	0.45	0.0-3.0	0.2	6.6	0.06	0.45	0.0-3.0	0.4	12.3	0.18	0.71
Nova Scotia Duck Tolling Retriever	38	1.0-12.0	6.3	5.49	7.11	0.0-2.0	0.2	3.4	0.09	0.42	0.0-4.0	0.2	2.6	0.06	0.34	0.0-4.0	0.4	5.9	0.2	0.62
Papillon	99	1.0-7.0	3.2	2.82	3.53	0.0-1.0	0.1	1.9	0.02	0.13	0.0-2.0	0.1	4.6	0.08	0.24	0.0-2.0	0.2	6.4	0.12	0.31
Pekingese	10	1.0-7.0	2.8	1.86	4.05	0.0-0.0	0	0	0	0.37	0.0-2.0	0.4	14.3	0.11	1.02	0.0-2.0	0.4	14.3	0.11	1.02
Petit Basset Griffon Vendeen	21	1.0-8.0	5.1	4.18	6.16	0.0-3.0	0.2	4.7	0.08	0.56	0.0-2.0	0.1	2.9	0.03	0.42	0.0-3.0	0.4	7.5	0.16	0.75
Phalene	21	1.0-6.0	3.4	2.68	4.32	0.0-1.0	0.1	2.8	0.01	0.34	0.0-1.0	0.1	4.3	0.03	0.42	0.0-2.0	0.2	6.9	0.08	0.56
Pointer	51	1.0-12.0	7.6	6.85	8.38	0.0-2.0	0.4	4.9	0.22	0.58	0.0-1.0	0.2	2.2	0.07	0.31	0.0-2.0	0.5	7	0.35	0.77
Pomeranian	95	1.0-5.0	2.3	2.02	2.64	0.0-2.0	0.1	2.7	0.02	0.14	0.0-2.0	0.1	3.3	0.03	0.15	0.0-2.0	0.1	5.9	0.07	0.23
Poodle (Medium)	61	1.0-8.0	3.8	3.3	4.29	0.0-2.0	0.1	1.7	0.02	0.17	0.0-3.0	0.1	4	0.07	0.28	0.0-3.0	0.2	5.7	0.11	0.36
Poodle (Miniature)	81	1.0-6.0	3	2.62	3.39	0.0-2.0	0.1	2.1	0.02	0.14	0.0-1.0	0	1.3	0.01	0.11	0.0-2.0	0.1	3.3	0.04	0.2
Poodle (Standard)	56	1.0-12.0	7	6.36	7.77	0.0-2.0	0.2	2.5	0.09	0.33	0.0-2.0	0.1	1.6	0.04	0.23	0.0-3.0	0.3	4.1	0.16	0.46
Poodle (Toy)	63	1.0-4.0	2.3	1.99	2.76	0.0-1.0	0	2	0.01	0.14	0.0-1.0	0	2.1	0.01	0.14	0.0-1.0	0.1	4.1	0.04	0.21

Appendix I.

Table A. Litter size and perinatal mortality, all breeds

Breed	Litters	Littersize				Stillborn per litter					Mortality during the 1.week after birth*					Perinatal mortality **				
	n	Range	Mean	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper	Range	Mean	%	CI lower	CI upper
Pug	54	1.0-8.0	4.1	3.57	4.67	0.0-5.0	0.4	10	0.26	0.62	0.0-5.0	0.3	8	0.17	0.48	0.0-7.0	0.7	17.2	0.5	0.97
Pyrenean Mountain Dog	10	1.0-10.0	6.9	5.37	8.73	0.0-0.0	0	0	0	0.37	0.0-3.0	0.4	5.8	0.11	1.02	0.0-3.0	0.4	5.8	0.11	1.02
Rhodesian Ridgeback	17	1.0-15.0	8.8	7.41	10.29	0.0-3.0	0.4	4	0.13	0.77	0.0-4.0	1	11.9	0.58	1.6	0.0-6.0	1.4	15.4	0.86	2.03
Rottweiler	114	1.0-13.0	7.6	7.12	8.14	0.0-4.0	0.3	3.7	0.19	0.4	0.0-7.0	0.3	3.7	0.19	0.39	0.0-7.0	0.6	7.3	0.43	0.71
Rough Collie	61	1.0-10.0	5.5	4.92	6.11	0.0-3.0	0.4	6.6	0.23	0.55	0.0-3.0	0.4	8	0.27	0.61	0.0-4.0	0.8	14	0.57	1.03
Samoyed	17	1.0-12.0	6.8	5.64	8.18	0.0-4.0	0.6	9.5	0.32	1.16	0.0-2.0	0.5	8.6	0.24	0.01	0.0-5.0	1.2	17.2	0.72	1.82
Schnauzer	19	1.0-10.0	6.2	5.09	7.38	0.0-2.0	0.3	4.3	0.09	0.61	0.0-3.0	0.2	3.6	0.06	0.54	0.0-3.0	0.5	7.7	0.22	0.9
Shetland Sheepdog	164	1.0-7.0	3.8	3.52	4.13	0.0-4.0	0.2	5.4	0.14	0.29	0.0-2.0	0.2	6.6	0.17	0.33	0.0-4.0	0.4	11.7	0.35	0.56
Shiba Inu	23	1.0-7.0	3.5	2.8	4.38	0.0-1.0	0.1	2.5	0.01	0.31	0.0-1.0	0	1.3	0	0.24	0.0-1.0	0.1	3.7	0.03	0.38
Shih Tzu	57	1.0-9.0	4.2	3.7	4.78	0.0-2.0	0.1	1.7	0.02	0.18	0.0-3.0	0.2	4.2	0.08	0.32	0.0-3.0	0.2	5.8	0.13	0.41
Siberian Husky	42	1.0-9.0	5	4.35	5.72	0.0-1.0	0	1	0.01	0.17	0.0-1.0	0.1	2.4	0.04	0.28	0.0-1.0	0.2	3.3	0.07	0.34
Small Munsterlander	13	1.0-11.0	6.7	5.36	8.26	0.0-2.0	0.4	5.7	0.13	0.9	0.0-1.0	0.2	3.7	0.05	0.67	0.0-2.0	0.6	9.2	0.27	1.21
Soft Coated Wheaten Terrier	34	1.0-10.0	5.5	4.71	6.32	0.0-0.0	0	0	0	0.11	0.0-0.0	0	0	0	0.11	0.0-0.0	0	0	0	0.11
St. Bernard	25	1.0-18.0	6.9	5.89	7.99	0.0-5.0	0.6	8.1	0.31	0.94	0.0-7.0	0.4	7	0.22	0.79	0.0-12.0	1	14.5	0.65	1.48
Staffordshire Bull Terrier	36	1.0-10.0	5.6	4.89	6.47	0.0-2.0	0.3	5.4	0.15	0.55	0.0-1.0	0.1	1	0.01	0.2	0.0-3.0	0.4	6.4	0.19	0.62
Swedish Dachsbracke (Drever)	54	1.0-12.0	5.9	5.29	6.61	0.0-4.0	0.2	3.4	0.1	0.36	0.0-1.0	0.1	1.9	0.04	0.24	0.0-4.0	0.3	5.3	0.18	0.5
Swedish Elkhound (Jämthund)	31	1.0-14.0	7.8	6.85	8.85	0.0-6.0	0.5	6.6	0.3	0.84	0.0-3.0	0.3	4.4	0.16	0.59	0.0-6.0	0.8	10.7	0.55	1.23
Swedish Lapphund	15	1.0-8.0	4.4	3.4	5.6	0.0-1.0	0.1	1.5	0	0.37	0.0-1.0	0.1	1.5	0	0.37	0.0-1.0	0.1	3	0.02	0.48
Tervueren	26	1.0-9.0	6	5.1	7.02	0.0-1.0	0.1	1.3	0.01	0.28	0.0-2.0	0.1	1.9	0.02	0.34	0.0-2.0	0.2	3.2	0.06	0.45
Tibetan Spaniel	185	1.0-8.1	3.7	3.44	4	0.0-2.0	0.1	1.7	0.03	0.11	0.0-6.0	0.2	4.5	0.11	0.23	0.0-6.0	0.2	6.1	0.16	0.31
Tibetan Terrier	17	1.0-9.0	5.6	4.52	6.83	0.0-1.0	0.1	2.1	0.01	0.43	0.0-0.0	0	0	0	0.22	0.0-1.0	0.1	2.1	0.01	0.43
Welsh Corgi (Pembroke)	13	1.0-9.0	5.8	4.61	7.32	0.0-5.0	0.9	15.8	0.48	1.61	0.0-2.0	0.4	7.8	0.13	0.9	0.0-5.0	1.3	22.4	0.76	2.09
West Highland White Terrier	19	1.0-7.0	3.6	2.83	4.6	0.0-1.0	0.1	1.4	0	0.29	0.0-3.0	0.3	7.4	0.09	0.61	0.0-3.0	0.3	8.7	0.12	0.69
Whippet	25	1.0-10.0	6.8	5.78	7.86	0.0-2.0	0.1	1.8	0.03	0.35	0.0-1.0	0.1	1.2	0.01	0.29	0.0-2.0	0.2	3	0.07	0.47
Yorkshire Terrier	21	1.0-6.0	3.7	2.89	4.58	0.0-2.0	0.2	5.2	0.05	0.49	0.0-1.0	0.1	4.1	0.03	0.42	0.0-2.0	0.3	9.1	0.13	0.69
Total	5591	1.0-18.0	5.4			0.0-8.0	0.2	4.1			0.0-10.0	0.2	3.7			0.0-12.0	0.4	7.7		

Appendix II

Table B. Dog size group, litter size and perinatal mortality

Dog size group	Litters	Litter size			Stillborn	Mortality during the 1.week*	Perinatal mortality**
	n	**Median**	**Range**	**Mean**	**%**	**%**	**%**
Miniature breeds (<5kg)	797	3	1.0-9.0	3,5	2,7	3,9	6,5
Small breeds (5-10kg)	1548	4	1.0-14.0	4,2	3,0	3,7	6,6
Medium breeds (10-25kg)	1384	6	1.0-15.0	5,7	3,9	3,4	7,1
Large breeds (25-45)	1619	7	1.0-15.0	6,8	5,1	3,6	8,6
Giant breeds (>45kg)	243	7	1.0-18.0	7,5	5,2	5,0	9,9
Total	**5591**	**5**	**1.0-18.0**	**5,4**	**4,1**	**3,7**	**7,7**

*Mortality during the first week after birth, stillborn puppies are not included
**Perinatal mortality, includes stillborn puppies and puppies that died during the first week of life

Appendix III

Table C : Stillborn, dog size group and litter size

No stillborn per litter	Miniature breeds			Small breeds			Medium breeds			Large breeds			Giant breeds			Sum litters	Range litter size all litters	Mean litter size all litters
	Litters n	Mean	Range	Litters n	Mean	Range	Litters n	Mean	Range	Litters n	Mean	Range	Litters n	Mean	Range	n		
0	733	3.4	1.0-9.0	1398	4.1	1.0-10.0	1178	5.5	1.0-15.0	1271	6.5	1.0-14.0	194	7	1.0-16.0	4774	1,0-16,0	5.1
1	55	3.9	2.0-9.0	124	4.7	2.0-13.0	142	6.4	2.0-13.0	215	7.6	2.0-15.0	24	8.1	3.0-11.0	560	2,0-15,0	6.3
2	8	4.8	3.0-8.0	17	5.1	3.0-9.0	43	6.9	3.0-12.0	86	8.2	3.0-15.0	12	9.6	6.0-13.0	166	3,0-15,0	7.5
3	1	5	5.0-5.0	4	6.3	4.0-8.0	12	8.1	5.0-14.0	26	9	4.0-15.0	7	11.3	8.0-14.0	50	4,0-15,0	8.8
4	0	-	-	2	5.5	5.0-6.0	7	8.4	5.0-13.0	11	9.4	5.0-13.0	5	10.4	5.0-17.0	25	5,0-17,0	9
>4	0	-	-	3	10	8.0-14.0	2	8.5	7.0-10.0	10	10.7	6.0-14.0	1	18	18.0-18.0	16	6,0-18,0	10.8
Total	797	3.5	1.0-9.0	1548	4.2	1.0-14.0	1384	5.7	1.0-15.0	1619	6.8	1.0-15.0	243	7.5	1.0-18.0	5591	1,0-18,0	5.4

Appendix IV

Table D: Number of puppies that died during the first week, dog size group and litter size

No dead first week	Miniature breeds			Small breeds			Medium breeds			Large breeds			Giant breeds			Sum litters	Range litter size	Mean litter size
		Litter size			Litter size			Litter size			Litter size			Litter size				
	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	all litters	all litters
0	711	3.4	1,0-9,0	1370	4.1	1,0-14,0	1209	5.5	1,0-15,0	1381	6.6	1,0-15,0	195	7.0	1,0-16,0	4866	1,0-16,0	5.2
1	72	4.2	2,0-9,0	141	4.8	2,0-10,0	127	6.5	2,0-14,0	154	7.8	2,0-13,0	27	8.9	3,0-14,0	521	2,0-14,0	6.2
2	11	6.0	4,0-8,0	27	5.5	3,0-13,0	30	7.0	3,0-12,0	52	7.9	3,0.14,0	13	9.8	6,0-15,0	133	3,0-15,0	7.2
3	2	5.0	4,0-6,0	5	6.0	5,0-7,0	12	8.4	6,0-13,0	18	9.8	4,0-15,0	4	8.8	6,0-11,0	41	4,0-15,0	8.6
4	-	-	-	1	5.0	5,0-5,0	3	10.0	7,0-13,0	10	9.5	6,0-13,0	2	11.5	6,0-17,0	16	5,0-17,0	9.6
>4	1	8	8	4	7.5	6,0-9,0	3	8	6,0-10,0	4	10	8,0-11,0	2	19	10,0-18,0	14	6,0-18,0	9.3
Total	797	3.5	1,0-9,0	1548	4.2	1,0-14,0	1384	5.7	1,0-15,0	1619	6.8	1,0-15,0	243	7.5	1,0-18,0	5591	1,0-18,0	5.4

Appendix V

Norsk Kennel Klub

Postboks 163 Bryn, 0611 Oslo. Tlf. 21 600 900

Skjemaet fylles ut med blokkbokstaver
EN bokstav eller tegn i hver rute!

Midlertidig registreringsanmeldelse med gratis valpeforsikring

Se informasjon om midlertidig registrering og vilkår for gratis valpeforsikring på baksiden.

Generell informasjon

I NKKs register opptas alle hunder som er født i Norge dersom begge foreldre er av samme rase og registrert i NKKs eller av NKK anerkjent utenlandsk register. For valper født etter 1/1-98 må også begge foreldre være ID-merket. For endel raser gjelder enkelte tilleggskrav. Oversikt over disse fås ved å kontakte NKK. Registreringsanmeldelsen skal underskrives av både oppdretter(e) og hannhundeier(e). Oppdretter er den som eide eller disponerte tispen for avl på paringstidspunktet. Skal andre enn registrert eier godtas som oppdretter, må det foreligge en disposisjonserklæring fra eier til vedkommende på dette. Samme regel gjelder for hannhund. Det er oppdretters plikt å være kjent med de krav som gjelder, og manglende kjennskap kan ikke påberopes som grunnlag for dispensasjon senere. Vi gjør uttrykkelig oppmerksom på at dersom det gis falske eller feil opplysninger ved registreringen, kan dette medføre at kullet senere avregistreres med de konsekvenser dette kan medføre uten at NKK kan holdes ansvarlig.

ALLE spørsmål på grå bakgrunn MÅ besvares.

Ved første gangs bruk av utenlandske hunder i Norge MÅ kopi av registreringsbeviset medfølge. Utenlandske hunder permanent innført til Norge skal i tillegg omregistreres til NKKs register først.

Utydelige eller ufullstendige registreringsanmeldelser vil bli returnert.

Opplysninger om hannhunden.

Reg.nr: Rase:

Tittel:

Navn:

Eier/e:

Spørsmål til hannhund-eieren

Har hannhunden vært utstillt hos NKK eller samarbeidende klubb? JA NEI

Hvor/når? Premie:

Er det registrert valper etter denne hannhunden tidligere i NKK? JA NEI Årstall:

Dersom ingen av ovennevnte spørsmål besvares med JA må det vedlegges testikkelattest fra veteriner eller autorisert utstillingsdommer!

Hvordan ble parringen utført? Naturlig parring Inseminering m. fersk sæd Inseminering m. frossen sæd

Undertegnede bevitner at ovennevnte hannhund den / / ble paret med nedenfor nevnte tispe.

Sted Dato Hannhundeiers underskrift/er (alle eller disp.erklæring)

Opplysninger om tispen og kullet

Reg.nr: Rase:

Tittel:

Navn:

Oppdretter/e: (dette kullet)

Gate adresse:

Postnr: Poststed:

Telefon:

Kennelnavn: (reg. hos NKK) Medlemsnummer: (KNM ved bruk av kennelnavn)

Medl. i klubb: (kun UTEN kennelnavn)

Valpenes fødselsdato: / / Antall valper Levende fødte: Død fødte: Levende etter 1 uke: Hanner til reg.: Tisper til reg.:

Spørsmål til oppdretter

1. Er tispen paret på første løpetid.....................................? JA NEI
2. Er det mindre enn 12 måneder siden sist tispen hadde valper? JA NEI
3. Har tispen hatt løpetid siden forrige kull uten at den er paret.? JA NEI

Spørsmål 1 besvares KUN ved første kull. Spørsmål 2 og 3 MÅ besvares ved senere kull.

Betaling skjer pr.: Sjekk vedlagt Faktura fra NKK (se info på baksiden)

OBS. Oppdretter som IKKE er medlem I NKK eller samarbeidende klubb må betale dobbel avgift!

Sted Dato Oppdretters underskrift/er (alle eller disp.erklæring)

NKKMID_A03A1FD - VS 13.06.2007

Appendix VI

Norsk Kennel Klub

Postboks 163 Bryn, 0611 Oslo. Tlf. 21 600 900

Skjemaet fylles ut med blokkbokstaver
EN bokstav eller tegn i hver rute!

Registreringsanmeldelse og paringsbevis

Generell informasjon

I NKKs register opptas alle hunder som er født i Norge dersom begge foreldre er av samme rase og registrert i NKKs eller av NKK anerkjent utenlandsk register. For valper født eller 1/1-99 må også begge foreldre være ID-merket. For endel raser gjelder enkelte tilleggskrav. Oversikt over disse fås ved å kontakte NKK. Registreringsanmeldelsen skal underskrives av både oppdretter(e) og hannhundeier(e). Oppdretter er den som eide eller disponerte tispen for avl på paringstidspunktet. Skal andre enn registrert eier godtas som oppdretter, må det foreligge en dispositjonserklæring fra eier til vedkommende på dette. Samme regel gjelder for hannhund. Det er oppdretters plikt å være kjent med de krav som gjelder, og manglende kjennskap kan ikke påberopes som grunnlag for dispensasjon senere. Vi gjør uttrykkelig oppmerksom på at dersom det gis falske eller feil opplysninger ved registreringen, kan dette medføre at kullet senere avregistreres med de konsekvenser dette kan medføre uten at NKK kan holdes ansvarlig.

ALLE spørsmål på grå bakgrunn MÅ besvares.
Ved første gangs bruk av utenlandske hunder i Norge MÅ kopi av registreringsbeviset medfølge. Utenlandske hunder permanent innført til Norge skal i tillegg omregistreres til NKKs register først.
Registreringsbevisene for kullet sendes samlet til oppdretter.
Utydelige eller utullstendige registreringsanmeldelser vil bli returnert.

Opplysninger om hannhunden.

Reg.nr: | Rase:

Tittel:

Navn:

Eier/e:

Spørsmål til hannhund-eieren

Har hannhunden vært utstillt hos NKK eller samarbeidende klubb? JA NEI

Hvor/når? Premie:

Er det registrert valper etter denne hannhunden tidligere i NKK? JA NEI Antall:
Dersom ingen av ovennevnte spørsmål besvares med JA, må det vedlegges testikkeltest fra veterinær eller autodisert utstillingsdommer!

Hvordan ble parringen utført? Naturlig parring | Inseminering m. fersk sæd | Inseminering m. frossen sæd

Undertegnede bevitner at ovennevnte hannhund den / / ble paret med nedenfor nevnte tispe.

Sted Dato Hannhundeiers underskrift (alle eierdeportalisering)

Opplysninger om tispen og kullet

Reg.nr: | Rase:

Tittel:

Navn:

Oppdretter/e: (dette kullet)

Gate adresse:

Postnr: | Poststed:

Telefon:

Kennelnavn: (reg. hos NKK) | Medlemsnummer: (KRAV ved bruk av kennelnavn)

Medl. i klubb: (bull UTEN kennelnavn)

Valpenes fødselsdato: / /

Antall valper | Levende fødte: | Død fødte: | Levende etter 1 uke: | Hanner til reg.: | Tisper til reg.:

Spørsmål til oppdretter

Er det registrert valper av samme kull tidligere (samme f.dato)? JA NEI Evt. når:

1. Er tispen paret på første løpetid.....? JA NEI
2. Er det mindre enn 12 måneder siden sist tispen hadde valper? JA NEI
3. Har tispen hatt løpetid siden forrige kull uten at den er paret.? JA NEI

Spørsmål 1 besvares KUN ved første kull.
Spørsmål 2 og 3 MÅ besvares ved senere kull.

Betaling skjer pr.: Sjekk vedlagt | Faktureres av NKK (se mer info. på baksiden)

OBS. Oppdretter som IKKE er medlem i NKK eller samarbeidende klubb må betale dobbel avgift!!

Sted Dato Oppdretters underskrift (alle eierdeportalisering)

TRYKKERI AS-31.08.2007

Norges veterinærhøgskole

Institutt for smådyrsjukdommer

Appendix VII

Norsk Kennel Klub
Pb 163 Bryn
0611 Oslo

Oslo 23.januar 2007

Søknad om tillatelse til bruk av Norsk Kennel Klubs registreringer

Vi søker herved om å få tillatelse til å bruke data fra NKK i forbindelse med undersøkelsen Valpedødelighet hos et utvalg hunderaser i Norge. Undersøkelsen vil bli gjennomført av fire fordypningsstudenter i samarbeid med deres veileder Astrid Indrebø.

Formålet med undersøkelsen er å kartlegge valpedødelighet og kullstørrelse i den norske hundpopulasjonen og undersøke om det er sammenheng mellom valpedødelighet, kullstørrrelse og følgende variabler: rase, tispas alder, hannhundens alder, årstid for fødsel og paringsmetode.

Vi ønsker å benytte oss av elektroniske data fra registrering av valpekull for alle raser i 2006 og frem til det tidspunktet dataene hentes ut, og eventuelle tidligere data hvor oppdretter har registrert kullet via web. I tillegg til opplysninger om tispe og hannhund (rase, navn, registreringsnummer, fødselsdato) ønsker vi følgende parametere: valpenes fødselsdato, antall levende fødte, antall dødfødte, antall levende etter 1 uke, antall registrerte valper, hvorvidt tispen er paret på første løpetid, om det er mindre enn 12 mnd siden tispen hadde valper, om den har hatt løpetid siden forrige kull uten at den er paret samt opplysninger om hvordan paringen ble utført (naturlig paring, inseminering med fersk sæd, inseminering med frossen sæd).

Undersøkelsen vil bli offentliggjort i form av en fordypningsoppgave ved Norges veterinærhøgskole i desember 2007. Målet er å få publisert en artikkel i et internasjonalt fagtidsskrift.

Et eksemplar av fordypningsoppgaven vil bli sendt NKK, og resultater fra undersøkelsen vil bli lagt frem på NKKs Forskningsforum Hund 2008.

Alle opplysninger som kan identifisere hund og eier vil bli behandlet konfidensielt. Dataene fra NKKs registreringer vil ikke bli brukt til andre formål enn denne undersøkelsen, og det vil oppgis i publikasjoner som utgår fra undersøkelsen samt annen informasjon om undersøkelsen at dataene er fra NKKs database og at de brukes etter avtale med NKK.

Vi ber om at NKKs svar sendes veileder Astrid Indrebø. Vi tar selv kontakt med NKKs IT-sjef for å få tilgang til de nødvendige data.

Med vennlig hilsen

Kaja S. Borge, veterinærstudent
kaja.borge@veths.no

Astrid Indrebø, prosjektleder
(ef) astrid.indrebo@veths.no

Øvrige studenter: Linn T. Andersen, Ingrid Toftaker og Ragnhild Tønnessen

Appendix VIII

NORSK KENNEL KLUB
Hundeselskap organisasjon

Hund til nytte og glede

Oslo, 15. februar 2007

Norges veterinærhøgskole
Institutt for smådyrsjukdommer
Postboks 8146 – Dep.
0033 Oslo

Att.: Veterinærstudent Kaja S. Borge og prosjektleder Astrid Indrebø.

Det vises til deres brev av 23. januar, hvor det søkes tillatelse til bruk av data fra Norsk Kennel Klub registreringer i 2006 i forbindelse med undersøkelse om valpedødelighet hos et utvalg hunderaser i Norge, veiledet av Astrid Indrebø.

På bakgrunn av de kriterier som NVH nevner i sitt brev, er søknaden godkjent.

Dette betyr bl.a. at alle opplysninger skal behandles konfidensielt og at dataene ikke skal benyttes i andre formål enn denne undersøkelsen.

Vi imøteser et eksemplar av fordypningsoppgaven når denne er fullført.

Vennlig hilsen
NORSK KENNEL KLUB

Bjørn Engh
Administrerende direktør

TILKNYTTET

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