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Epidemiological analysis of reproductive performance and pre-weaning mortality rates in 27221 purebred French female dogs and 204 537 puppies


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Evaluation of reproductive performance within a kennel requires the knowledge of a reference range. This range can be obtained from field data and on a large number of animals maintained in various housing management and environmental conditions. To date, most available data are either based on a few kennels or focussed on few success criteria. Only litter size and puppy mortality rates are reported in 2 multicentre studies (500 litters [1] in Australia; 10 810 litters [2] in Norway). The objective of the present study was to provide reference ranges for reproductive performance in purebred dogs, from mating to weaning, through the analysis of a dataset collected at a national level (France). The aim was also to identify factors influencing reproductive performance. Data were collected between 2010 and 2014 in 5667 French breeding kennels via software used for reproduction management (Breeding Management System, BMS, Royal Canin, Aimargues, France). Information was recorded by breeders on a voluntary basis and anonymised prior analysis. The influence of breed size (Mini adult body weight <10 kg; Medium 10-25 kg; Maxi 25-40 kg; Giant >40 kg), age of dam and male on pregnancy rate, abortion rate were evaluated by multivariable models (SAS, Cary, USA). The influence of the same factors together with that of litter size (small if below the first quartile of the litter sizes within the breed size - large if over the third quartile) on total puppy mortality within the litter was evaluated similarly. Data on 45 913 heats (all with mating), from 27 221 bitches from 248 breeds were analysed. Fifty six percent of the heats were from Mini breeds, 17.4% from Medium, 20.5% from Maxi and 6.1% from Giant. The three most represented breeds were Chihuahua (7.8% of the heats, 2132 bitches), Yorkshire Terrier (6.2%; 1698), Cavalier King Charles Spaniel (6.1%; 1668). Ninety one percent of the kennels contributed from 1 to 20 heats and 92% of the bitches had 1 to 3 heats in the database. At mating, mean age (±SD) was 3.1±1.8 years for bitches and 3.3±2.0 for males. 88.5% of the males used for mating originated from the same kennel as the females. Pregnancy rate (number of pregnant females based on breeders declaration/number of heats) was 87.8%. Among the pregnant bitches, 6.8% aborted. Pregnancy rate was significantly (P<0.0001) influenced by breed size (OR 0.7 Giant vs Mini) and dam and male age (the highest at the age of 2 years for females, and 3 years for males). Abortion rate was influenced by breed size (the highest for Giant) and the age of the female (the lowest at 2 years) (P<0.0001 for both). Finally 81.9% of the mated females gave birth to a litter. Data on 37 946 litters, accounting for 204 537 puppies were analysed. Mean litter size was 5.4±2.8 puppies (range 1 to 24), which was significantly influenced of breed size and dam age (4.6±2.2 before one year, 5.6±2.9 at 2 years, 4.9±2.8 at 8 years) (P<0.0001 for both). Stillbirth was 7.4%, accounting for 54.8% of the total mortality (from birth to selling). Total mortality rate in puppies (puppies dying before selling/total number of puppies born, i.e. stillbirth included) was 13.4%. At the litter level, it was affected by breed size (29.6% of litters with mortality in Giant breeds vs 18.5% in Mini), male age, litter size (46.6% of large litters had at least one dead puppy vs 10.4% in small litters) (P<0.001 for all). To our best knowledge, the canine population evaluated in this work is the largest ever analysed and this study thus provides reference values on reproductive performance in dogs.