Risk factors for canine dystocia and stillbirths
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Studies that describe risk factors for canine dystocia and stillbirths typically do not have appropriate non-dystocia controls. This study aimed to 1) evaluate risk factors for canine dystocia; 2) assess risk factors for stillbirth in puppies, by examining all whelping and puppies born in a breeding population during a defined period. We hypothesize that dystocia risk is affected by maternal factors, and stillbirth risk is influenced by whelping and puppy parameters. A retrospective observational epidemiologic study was performed. Data were collected from all whelpings in a guide dog breeding facility from 2003 to 2015. The breeding colony consisted mostly of Labrador Retrievers with some German Shepherds and Golden Retrievers. Variables tested were: dam signalment (age, breed, parity, and dam ID), whelping information (duration, litter size, abnormalities, contraction quality, difficulty of whelping), interventions (calcium management, oxytocin management, cesarean section performed), and information on the puppy outcomes (survived or stillborn, weight). Statistical analysis was done using mixed-effect logistic regression models PROC GLIMMIX of SAS version 9.4. Repeated measures analysis was used for dystocia risk with parity and dam while litter was used as the random effect for stillbirth risk. The final model was built using a backward-stepwise method. A total of 696 litters from 265 bitches was analyzed. Overall dystocia rate was 24.9%. Parity and maternal age ranged from one to eight and dystocia decreases as age-of-dam and parity number increases. First-parity litters had odds ratios (OR) of 1.6, 1.7, and 5.4 for dystocia compared with second, third, and fifth-parity-litters, respectively. Maternal age was also associated with dystocia risk. Bitches under two-years-of-age had a dystocia rate of 19% and increased to 31% in two-year-olds. Then dystocia rates decreased to 26%, 21%, 11%, and 6%, respectively for three, four, five, and six-year-olds before increasing again to 50% in bitches > six years. Age-at-first-parity also affected dystocia risk where bitches having her first litter after turning two-years-old had 2.4 times higher likelihood of dystocia compared with bitches having her first litter between one and two years-of-age. There was a significant effect of the bitch on dystocia risk, suggesting individual predisposition. A total of 5,455 puppies were born with a 4.7% stillbirth rate. Factors that affected stillbirths were: large (OR = 2.3) and small (OR = 9.2) puppies in the top and bottom 2.5% of birth weights, puppies that were assisted in delivery (OR = 3.9), animals delivered by cesarean section (OR = 2.1), unusual birth position (OR = 4.8), and oxytocin use (OR = 1.5). There was a tendency for litter size effect on dystocia, but calcium use and age of dam were not associated. Dystocia risk generally decreases with increasing maternal age and parity. There were only six litters born from bitches > six years-of-age but 50% required intervention. Stillbirth risk increased as expected in large and small puppies, abnormal position and obstetrical interventions such as cesarean section and oxytocin use. Surprisingly litter size, maternal age, and calcium use did not increase stillbirth rates. We report the significant risk factors and for canine dystocia and stillbirths from data of all whelping and births from a breeding colony.

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