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Placental weight and its relationship with newborn puppy size measurements in bitches undergoing Caesarean section
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The placenta is the feto-maternal interface and is responsible for all oxygen and nutrient exchange between the fetus and the dam. As such, it is the principal regulator of birth weight\(^1\). Placental weight (PLW) has been shown to have a strong positive association with neonatal weight at birth in several species e.g. in horses\(^2\), and the normal placenta weighs \(\sim 11\%\) of the foal’s birth weight\(^3\). The aim of our study was to investigate the relationship between PLW and neonatal size at birth in dogs. Neonate puppy size measurements, i.e. birth weight (BW), crown-rump length (CRL) as well as gender of the first puppy of every litter delivered by Caesarean section (CS) were recorded after successful resuscitation and before colostrum intake. The corresponding whole placenta including the zonary placental region, the amnion and chorioallantois membranes and a small portion of the umbilical cord (~1cm) was weighed. Linear regression was used to analyze the association between PLW, CRL and BW of the pups, gender and litter size. Twenty-four CS were performed in 23 bitches of several breeds (pregnant body weight 2.8-43.6 kg, age 1-8 years). Ten were pluriparous and 13 primiparous. Litter size varied between 1 and 9 puppies. Elective CS was performed in 7, and emergency surgery in 17 cases. All puppies included in the study (13 males and 11 females) were healthy, active and nursed on the dam before leaving the hospital. Puppy size measurements and PLW varied widely in the study population (BW: 94 - 630g, CRL: 12 - 25cm, PLW: 18 - 82g), and PLW/BW ratio was 11.0 - 22.3%. Pup BW and CRL were significantly associated (\(R^2=0.906\)). PLW was related to both puppy BW and CRL (\(R^2=0.856, P<0.0001\) and \(R^2=0.819, P<0.0001\), respectively), while gender and litter size had no influence on puppy size measurements. For each increase of 1 g in PLW, there was a 6.77 g increase in puppy BW and an increase of 0.16 cm in CRL. The percentage of PLW to neonate BW was slightly higher and more variable in our study compared to e.g. the horse. This may be due to species differences in placentation type and the fact that dogs are polytocous. All pups included in the study were clinically healthy, which suggests that these relationships between PLW and neonate puppy size measurements are normal for the dog. However, our study population was small and unique due to the fact that all dogs underwent CS because of dystocia at the time of initial presentation or because of risk for dystocia in elective cases e.g. due to singleton pregnancy, which may have influenced the outcome. It would be interesting to examine these relationships between placental and neonate size characteristics in all puppies of a larger group of similar size bitches undergoing natural parturition.