ABSTRACTS

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Serum progesterone patterns in the pregnant bitch: A meta-analysis

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OBJECTIVES AND METHODS: Concentrations of serum progesterone (P4) during normal canine pregnancy have been reported, but the range of values at defined stages of gestation is fairly broad (1, 2, 9). Therefore, a meta-analysis of canine serum P4 values obtained in previous studies of different authors was performed to determine the P4 pattern as a guideline for clinical decision on progesterone supplementation in cases of impending abortion due to luteal insufficiency. A computerized literature review was carried out to find published reports about P4 concentrations in pregnant bitches using the keywords “bitch” and “progesterone” and “pregnancy”. The meta-analysis covered P4 concentrations from bitches of various breeds at the age of 2.5 to 6.5 years determined using different assay methods. Progesterone concentrations from bitches supplemented with progestagens were excluded. The GLM procedure in SAS (Version 9.1; SAS Institute, 2003) was used for statistical analysis. A fourth-order regression on Days after the LH peak (D-LH) was tested to depict a general P4 pattern throughout pregnancy; ANOVA was used to analyse the effect of age, breed and study on P4 concentration at each of the 9 weeks from LH peak to parturition (W-LH). The use of the LH peak as a landmark in most of the studies (1, 2, 3, 6, 7, 8, 10) and ovulation (4, 5) or mating (11, 12) or first day of cytologic diestrus (9) required standardization of the data. Therefore, in the current study, the LH peak or day 2 before ovulation, respectively, have been considered as day 0.

RESULTS: One hundred thirty-six studies were identified among which 12 were selected according to the pre-defined criteria (1-12). A total of 109 bitches (Beagle n=62, Labrador retriever n=24, German shepherd n=11, cross-bred n=8, unknown breed n=4) with normal pregnancy were included in these studies. The average P4 concentration pattern is characterized by an ascending portion between the LH peak and the maximum reached around 16 D-LH, followed by a progressive decrease until parturition (Figure 1) Due to the heterogeneous distribution of D-LH sampling, age and breed in different studies, ANOVA models were significant only at 4, 5 and 6 W-LH.

Figure 1: Mean serum progesterone (P4) concentration pattern of a group of 109 bitches with normal pregnancy. W-LH = weeks after the LH peak
CONCLUSIONS: The average P4 curve obtained in the present study describes the typical progesterone pattern of pregnant bitches as reported in individual studies; however the R² value indicates that only 57% of variability can be explained by the variation in the days of blood sampling (D-LH). The pre-partum period does not show the typical dramatic decrease of P4 concentrations caused by the final pre-partum luteolysis. This is reflected by the lack of significance P4 values during weeks 7, 8 and 9, and is likely due to differences in times of blood collection between the studies. The aim of this meta-analysis was to draw up a general P4 pattern for canine pregnancy. Although our results do not provide clear-cut reference values on P4 during the pregnancy in the German shepherds and Beagle breeds, there is a clear indication that guidelines could be produced with further studies performed in selected breeds with standardized protocols. Our data provide orientation regarding the descending portion of P4 patterns during mid-gestation (4-6 WLH). Due to the heterogeneity of experimental conditions in the different studies involved the ascending portion ought to be modeled separately. Further studies are needed to a) establish data which are significant for each week of pregnancy, and b) to assess the probability of individual deviations from an average curve which may be caused by affiliation to a breed different from those included in our study or by bitches older than 6.5 years. The canine population is composed of hundreds of different breeds, and it is unlikely that a single pattern of P4 concentration may work for all. A complete physical exam, ultrasonographic assessment of foetal viability and blood workup remain fundamental steps in deciding whether or not a pregnant bitch should be supplemented with progesterone or a progestagen, at least until more data is available on P4 concentrations during pregnancy on each specific breed.

(10) Smith MS, McDonald LE. Serum levels of luteinizing hormone and progesterone during the estrous cycle, pseudopregnancy and pregnancy in the dog. Endocrinology 1974;94:404-412.