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Folliculogenesis, oogenesis, and superovulation

Correlations between biometrics parameters and vascularization of corpora lutea and serum progesterone concentration in superovulated sheep

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In vivo embryo production performs an important role in small ruminants, however the efficiency of this biotechnology has high variability. In this context, the occurrence of luteal dysfunction is exacerbated in superovulated females (Rodriguez et al., 2015) and it is an unwanted response which may be related to low embryo production. Thus, it is possible to highlight the need to expand knowledge related to the corpora lutea functionality, as well as determinative tools for ultrasound diagnosis. The aim of this study was to test correlations between biometric variables, luteal vascularization and serum progesterone concentrations. Twenty-seven Santa Inês ewes were submitted to estrus synchronization protocol based on the use of progesterone device (0.3 g of P4, Eazi-breed CIDR[®], Zoetis, Brazil) for eight days and two equal doses of d-cloprostenol (37.5 µg, Prolise[®], AgenerUnião, Brazil) i.m. on Days 0 and 8. Superovulatory treatment started on Day 6, when the females were randomly divided into three groups according to the total exogenous FSH dose consisted of 100, 133 or 200 mg (Folltropin V[®], Vetoquinol, Brazil) in eight decreasing doses every 12 hours (Day 6 to Day 9). On Day 6, the females received 200 IU eCG i.m. (Novormon[®], Zoetis, Brazil). The females were subjected to natural breeding. Ovarian ultrasound evaluations (B-mode and Color Doppler) were performed daily during the early luteal phase, between Days 11 (beginning of luteogenesis) and 15 (corresponding to videolaparoscopy and surgical embryo recovery). From these evaluations, the diameter, area and volume of the corpora lutea were determined, as well as the percentage and volume of luteal vascularization. Blood samples were collected at all times of ultrasonographic evaluation for subsequent measurement of serum progesterone concentrations by the radioimmunoassay technique. Biometric variables, luteal vascularization and serum progesterone concentrations were correlated by Pearson's correlation test ($p < 0.05$). The animals treated with 100, 133 and 200 mg of FSH showed no difference regarding to the total amount of corpora lutea (classified as normal or regressed) in the ovaries ($p = 0.0822$, 0.7092 and 0.2252 , respectively). Positive correlations ($p < 0.0001$) were observed between serum progesterone concentrations and luteal diameter ($r = 0.24$), luteal area ($r = 0.24$), luteal volume ($r = 0.24$) and vascularization volume ($r = 0.18$) in all treatments. However, there was no correlation between serum progesterone concentrations and the percentage of vascularization. In conclusion, luteal vascularization is an indicative of corpus luteum functionality in superovulated ewes.