Effects of low serum progesterone concentrations on endometrial transcription at Days 8 and 12 of the estrous cycle in mares

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Changes in the endometrial transcriptome under the influence of serum progesterone (P4) have been reported in a number of species, including horses. However, there is little information available concerning relative changes in endometrial gene expression associated with low serum P4 concentrations. Our hypothesis was that low serum P4 during diestrus would affect endometrial gene expression when compared to control mares. Our objective was to evaluate changes in expression of target transcripts in mares with normal or low serum P4 concentrations. Mares were bled and scanned via rectal ultrasound on a daily basis during two cycles. Mares were randomly assigned to a uterine biopsy group (n=6 each group, on day 8 (D8) or on day 12 (D12) post-ovulation) and treatment order (control and treated cycle; 125 µg of cloprostenol IM on Days 0 through 3). Serum P4 concentrations were measured via ELISA and expressed as area under the curve (AUC) for the period between Days 0 and 8 post-ovulation. For gene expression analysis, target transcripts (PGR, ESR1, ESR2, OXTR, PTGER2, PTGER4, PTGES, PGFS, PTGS1, PTGS2, SCGB1A1, and uterocalin (P19)) were analyzed by quantitative RT-PCR, and data were analyzed with the comparative ΔΔCt method using B2M as a reference transcript. Changes between control and treated cycles were compared with a paired t-test. Serum P4 concentrations were lower in treated mares (D8: 33.5±1.8 & D12: 19.6±1.0 ng/day/mL±SEM) compared to control mares (D8: 98.8±7.2 & D12: 94.7±4.3) (p<0.0001). Quantitative RT-PCR demonstrated a down-regulation of PTGES (p=0.015) and of P19 (p=0.08) in mares with low serum P4 at Day 8. At Day 12, there was an up-regulation of ESR1, (p=0.001), PGR (p=0.003), SCGB1A1 (p=0.009) in treated mares. This study indicates that low serum concentrations of P4 have an effect on the endometrial gene expression during diestrus.

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