Effects of endogenous progesterone during ovarian follicle superstimulation on embryo quality and quantity in beef cows

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Despite modifications in techniques and protocols used for multiple ovulation embryo transfer (MOET) in the last couple decades, total quality embryos (TQE) recovered has remained relatively unchanged. The objective of this study was to evaluate the effects of endogenous progesterone during beef cow superstimulation on embryo quality and quantity. Thirty non-pregnant beef cows were sorted by breed, body condition, and age into 1 of 5 replicates. Presynchronization was staggered so each replicate began treatment on subsequent days and was accomplished using a 5 d CO-Synch + CIDR protocol. Nine days after estrus, ultrasound-guided dominant follicle removal (DFR) was performed concurrent with CIDR insertion and confirmation of a functional corpus luteum (d 0). Within each replicate, one-half of the cows were assigned a low progesterone (LP) treatment, and the other half were in the high progesterone (HP) control treatment. To remove endogenous progesterone, LP cows were administered prostaglandin F2α (PGF2α) at time of DFR. On d 1, cows began a timed, 13-d, superstimulation CIDR-based protocol with a total 320 mg FSH, (Folltropin-V, Vetoquinol), administered twice daily in decreasing amounts over four days. Cows were artificially inseminated (AI) twice (12 hours apart) on d 6 (2 days after PGF2α) using frozen-thawed semen from a single bull collection observed to have high success rates in previous superovulation research. Embryo recovery was performed on each replicate 7 days after first AI via non-surgical flush and embryos were evaluated by International Embryo Transfer Society (IETS) standards. Data were analyzed using the MIXED procedures of SAS. Results revealed a greater number of total embryos recovered from the HP than the LP cows (19.26 vs. 10.74, \( P = 0.01 \)). Additionally, the HP cows had greater number Stage 4 embryos along with increased amount of quality Grade 3 and 4 embryos than the LP group (5.76 vs 2.20 \( P = 0.002 \); 1.87 vs 0.61, \( P = 0.01 \); 8.22 vs 2.89, \( P = 0.01 \), respectively). However, a higher percentage of each recovery from LP cows were Grade1 embryos (58.22 vs 37.32, \( P = 0.03 \)). Moreover, the LP cows had a greater percentage of Stage7 and 6 TQE in a recovery (18.47 vs 1.22, \( P = 0.01 \); 10.37 vs 3.19, \( P = 0.03 \)). These data indicate that with removal of endogenous progesterone during follicle superstimulation, the percentage of embryos recovered are of higher quality grade and are potentially more advanced in their development on a single recovery. However, while poorer in quality, these data also indicate endogenous progesterone presence during follicle maturation results in a greater number of total embryos recovered. While more research is warranted to determine the effects of the LP treatment on embryo recovery success, these data implicate that DFR in conjunction with removal of endogenous progesterone during superstimulation is, at minimum, a viable alternative to traditional superovulation protocols. These data also highlight the need to identify if proportional improvements in embryo quality affect transfer success.

Keywords: Corpus luteum, dominant follicle removal, embryo, superovulation