Utilization of a 5- or 14-day progestin-based estrous synchronization protocol with sorted semen in beef heifers

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Introduction

Estrous synchronization protocols that utilize progestin via a controlled internal drug-release insert (CIDR) in conjunction with gonadotropin releasing hormone (GnRH) and prostaglandin (PG) treatments have been shown to be effective in beef heifers. Sorted semen is more costly than unsorted semen; thus, AI pregnancy rates need to be maximized when sorted semen is used. The objective of this study was to compare the effectiveness of a 5-day versus a 14-day CIDR protocol when sorted semen is utilized for AI in beef heifers. A secondary objective was to determine the effect of timing of insemination on pregnancy rates when using sorted semen.

Materials and Methods

Angus-cross beef heifers were randomly and equally distributed into two treatments groups on the basis of pubertal status, age, body condition score, and body weight. Treatment 1 (TRT1) heifers (n = 33) received a CIDR progesterone insert (Eazi-Breed CIDR) followed by a 100 mcg of GnRH (Factrel) on day 0. The CIDR was removed on day 5, followed by a single injection of 500 mcg of cloprostenol (Estrumate). Treatment 2 (TRT2) heifers (n = 33) received a CIDR on day 0, with removal of the CIDR on day 14. The TRT2 heifers then received GnRH on day 16 followed by 500 mcg of cloprostenol on day 21. At the time of PG administration, electronic mount detectors (HeatWatch) were placed on all heifers to monitor for estrus. An experienced technician performed AI at 14 to 28 hours after onset of estrus with X-chromosome sorted semen. Following the end of the initial AI period, heifers were monitored for an additional 21 days for return to estrus. Heifers exhibiting a return to estrus were inseminated with non-sorted semen. At 28 days after the initial insemination, all heifers were exposed to fertile bulls for approximately 30 days. Transrectal ultrasonography (Aloka 500V with 5 MHz transducer) was used to determine pregnancy status of heifers at 45 to 60 days after initial insemination, and again 30 days after removal of bulls. Fetal crown-to-rump length was used to determine whether pregnancies resulted from AI or subsequent natural service. Data were analyzed using statistical software (JMP, version 9.0). Nonparametric data were evaluated with Chi-Square analyses, and all other data were evaluated with analysis of variance.

Results

Estrous response to synchronization for heifers in TRT1 (51.5%) and TRT2 (57.6%) were similar ($P = 0.62$). A higher percentage of prepubertal heifers were induced to cycle by TRT2 (6/12 [50%]) than by TRT1 (1/11 [9.1%]; $P = 0.03$). The mean interval from PG administration to estrus (54.5 vs 47.5 h), length of estrus (11.4 vs 10.8 h) and mounts during estrus (44.2 vs 40.3) were similar ($P \geq 0.14$) between TRT 1 and TRT2, respectively. The sorted semen AI pregnancy rates for TRT1 (41.2%) and TRT2 (52.6%) were also similar ($P = 0.49$). Across treatments, AI pregnancy rates were similar ($P = 0.42$) at 30 days, 56.3% XX%, and 50% for heifers inseminated at 14 to 18, 19 to 23, and 24 to 28 hours after onset of estrus, respectively. The pregnancy rate for 15 heifers that returned to estrus and were inseminated with unsorted semen was 80%. Overall, seasonal pregnancy rate for heifers in TRT1 (93.9%) and TRT2 (91.9%) were similar ($P = 0.72$).

Significance

The estrus response and subsequent pregnancy rate in beef heifers was similar for synchronization protocols that used either a 5- or 14-day progestin treatment. The 14-day progestin treatment was more effective at induction of cycling in prepubertal heifers. Additional studies are needed to determine whether delaying AI until ≥ 19 hours after onset of estrus will increase pregnancy rates when sorted semen is used.