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Comparison of the CIDR Select and 5-day Select Synch + CIDR protocols that included limited estrus detection and timed insemination for synchronizing estrus in beef heifers

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ABSTRACT

The objective of this study was to compare AI pregnancy rates between the 5-d Select Synch + CIDR (5dCIDR; CIDR = controlled internal drug-release insert) and CIDR Select (CS) programs in replacement beef heifers with a limited period of estrus detection and AI followed by a timed insemination (TAI) of heifers not exhibiting estrus. Crossbred beef heifers (n = 318) were equally and randomly assigned to either the 5dCIDR or CS treatment. The 5dCIDR treatment consisted of gonadotropin-releasing hormone (GnRH) at CIDR insertion, followed 5 d later by CIDR removal and administration of two 25-mg doses of prostaglandin $F_{2\alpha}$ (PGF) administered approximately 12 h apart. The CS treatment consisted of insertion of a CIDR for 14 d, an injection of GnRH 9 d after CIDR removal, and administration of PGF 7 d following GnRH. In both treatments, heifers were detected for estrus for 52 h following PGF, and those exhibiting estrus were inseminated based on the AM/PM rule. Heifers not observed in estrus were TAI 72 h after PGF, concurrent with GnRH administration. Ten days following TAI, bulls were placed with the heifers for approximately 45 d. Estrus response tended (P = 0.07) to be greater in the CS treatment than in the 5dCIDR treatment. However, conception rate of heifers exhibiting estrus, TAI conception rate, overall AI pregnancy rate, and breeding season pregnancy rate did not differ (P > 0.10) between treatments. In conclusion, 5dCIDR and CS protocols were equally effective at synchronizing estrus in replacement beef heifers.

Key words: beef, controlled internal drug-release insert, estrus synchronization, heifer

INTRODUCTION

Recently, 2 protocols, the 5-d CO-Synch + CIDR (controlled internal drug-release insert) and the CIDR Select (**CS**), have been developed to facilitate timed artificial insemination (**TAI**) in beef heifers. Both protocols have resulted in greater TAI pregnancy rates in beef heifers than has the 7-d CO-Synch + CIDR program (Busch et al., 2007; Wilson et al., 2007). With both of these estrus synchronization approaches, combining a limited (<60 h) period of estrus detection and AI followed by TAI of heifers failing to be observed in estrus may increase overall AI pregnancy rates in beef heifers. However, both protocols have practical limitations. The 5-d Select Synch + CIDR and TAI (**5dCIDR**) protocol requires animals to be handled twice in a single day to deliver 2 injections of prostaglandin $F_{2\alpha}$ (**PGF**) 12 h apart on the day of CIDR removal, whereas the duration of the CS protocol (33

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d) and the necessity to handle the animals 5 times may limit its broad implementation within the industry. Although both protocols have limitations, both represent viable options for beef producers wanting to use estrus synchronization and AI. However, a direct comparison between the 5dCIDR and CS protocols has not been reported, making it difficult to reliably make recommendations to producers as to which protocol will deliver the greatest pregnancy rate. Therefore, the objective of this experiment was to compare AI pregnancy rates between the 5dCIDR and CS protocols in replacement beef heifers in which estrus detection was performed for 52 h and followed by TAI in heifers failing to exhibit estrus.

MATERIALS AND METHODS

Animals

All animals were handled in accordance with procedures approved by the Purdue University Animal Care and Use Committee. Nulliparous yearling Hereford × Angus beef heifers at Heaton Land and Livestock (Alton, UT; n = 318) were used in this experiment. Heifers were maintained in a dry lot and fed a haylage-based diet that was formulated to achieve at least 0.7 kg/d gain. Although BCS of the heifers were not recorded, heifers were in appropriate body condition at the time of estrus synchronization.

Description of Treatments

Heifers were randomly assigned to either the 5dCIDR or CS estrus synchronization program (Figure 1). Heifers assigned to the 5dCIDR protocol received an intravaginal progesterone-releasing insert (CIDR, Pfizer Animal Health, NewYork, NY) for 5 d as well as 100 μg of gonadotropin-releasing hormone (**GnRH**; Cystorelin, Merial, Duluth, GA; i.m.) at CIDR insertion. Five days following CIDR insertion, heifers were administered 25 mg of dinoprost tromethamine (PGF; Lutalyse, Pfizer Animal Health, NewYork, NY; i.m.) and the CIDR inserts were removed. All heifers in the 5dCIDR treatment received a second 25-mg injection of PGF approximately 12 h after the initial injection to ensure luteal regression. Heifers assigned to the CS protocol (Figure 1) received a CIDR for 14 d. Nine days following CIDR removal, heifers received GnRH and were then administered 25 mg of PGF 7 d following GnRH. Due to the number of heifers at this location, the day of PGF administration was offset by 24 h between treatments to facilitate animal handling and management and to minimize the difference in time between the first heifer and last heifer through the chute. Hence, heifers in the CS treatment received PGF 1 d in advance of heifers in the 5dCIDR treatment. Estrus detection was performed for 1 h, at minimum, in the AM and PM and concluded 52 h following PGF. Heifers observed in standing estrus were sorted from herdmates into an adjacent pen and artificially inseminated approximately 12 h after being detected in estrus. Heifers not detected in behavioral estrus within 52 h after the initial PGF injection were TAI concurrent with GnRH administration (100 μg) at approximately 72 h (70 to 74 h) after the initial PGF administration. Four AI technicians and a single AI sire were used to inseminate all heifers. All heifers observed in estrus and sorted to be bred were comingled, regardless of treatment. Heifers were randomly worked through the breeding box and randomly bred by one of the 4 inseminators. The treatments of the heifers were not known to the inseminators at the time of AI.

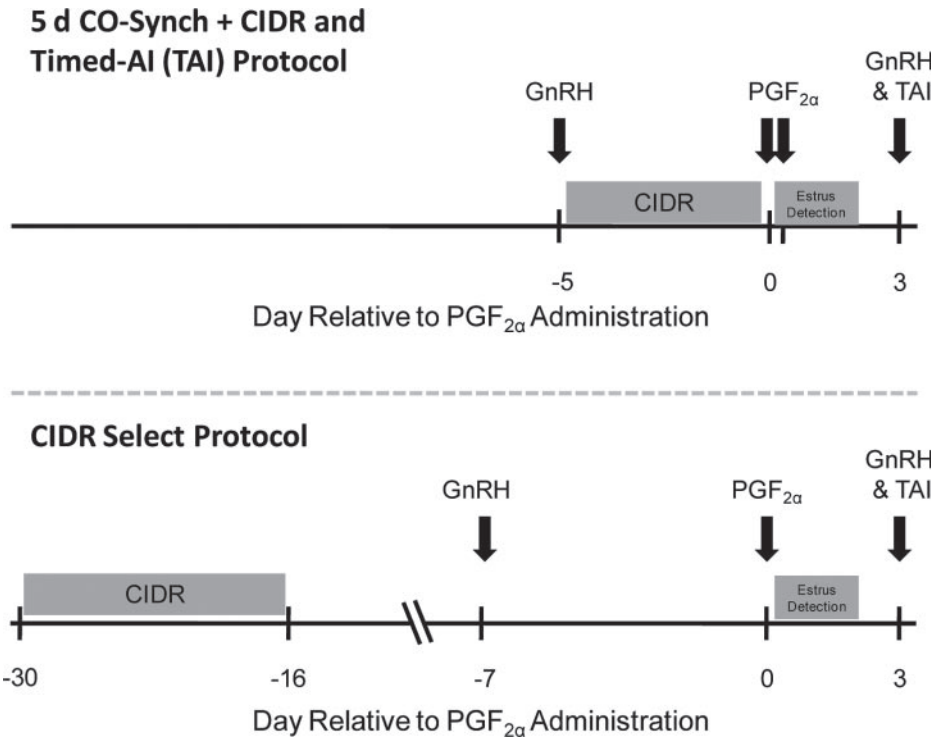

Figure 1. Illustration of the 5-d Select Synch + CIDR and timed-AI (TAI) and CIDR Select protocols that included 52 h of estrus detection and AI following prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) administration and TAI in heifers failing to exhibit estrus at 72 h after $PGF_{2\alpha}$ administration. CIDR = controlled internal drug-release insert; GnRH = gonadotropin-releasing hormone.

Breeding Season and Pregnancy Diagnosis

Ten days after TAI, intact bulls that were tested by a trained veterinarian for disease and fertility were placed with the heifers for 45 d. Pregnancy diagnosis was performed 35 d after TAI using transrectal ultrasonography (variable megahertz linear array transducer, MicroMaxx, Sonosite, Bothell, WA) to determine conception