The Professional Animal Scientist 26 (2010):307–312

Effect of 6- Versus 12-Hour Interval Between 2 Prostaglandin $F_{2\alpha}$ Injections Administered with 5-Day CO-Synch + Controlled Internal Drug-Release Protocol on Pregnancy Rate in Beef Cows

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ABSTRACT

The objectives of this study were to compare 2 prostaglandin (PG) $F_{2\alpha}$ injections administered at 6- or 12-h intervals and 5- versus 7-d controlled internal drug-release device (CIDR) insertion on timed AI (TAI) pregnancy rate in beef cows synchronized with CO-Synch protocols. The study was conducted at 2 locations using Angus-based multiparous cows (n = 257 at ranch 1, and n = 385 at ranch 2). Cows were randomly assigned to 1 of 3 treatments: 1) 7CO-Synch (control) cows received gonadotropin-releasing hormone (GnRH) and CIDR on d −7, $PGF_{2\alpha}$ concomitant with removal of the CIDR on d 0, and GnRH with TAI at 60 h; 2) 5CO-6H cows received GnRH and CIDR on d −5, $PGF_{2\alpha}$ at 0 and 6 h after removal of the CIDR on d 0, and GnRH with TAI at 72 h; and 3) 5CO-12H cows received GnRH and CIDR on d −5, $PGF_{2\alpha}$ at 0 and 12 h after removal of the CIDR on d 0, and GnRH with TAI at 72 h. Body condition score and postpartum interval were greater ($P < 0.01$) for cows on ranch 1 than ranch 2 (4.8 vs. 4.7 BCS and 79.5 vs. 68.1 d). Body condition score, postpartum interval, TAI pregnancy rate, and 70-d pregnancy rate did not differ ($P > 0.25$) between synchronization protocols, averaging 4.8, 73.8 d, 49.0%, and 58.1%, respectively. The extra time and costs associated with implementing the 5-d protocols with 2 $PGF_{2\alpha}$ injections compared with the 7-d protocol with 1 $PGF_{2\alpha}$ injection were not offset by higher TAI pregnancy rates.

Key words: beef cow, controlled internal drug-release device, gonadotropin-releasing hormone, prostaglandin $F_{2\alpha}$, timed artificial insemination

INTRODUCTION

Considerable time and effort has been spent developing protocols for synchronization of estrus and ovulation to facilitate the use of AI in the beef industry; however, only 7.6 and 7.9% of beef cattle operations in the United States use AI and estrus synchronization programs, respectively (USDA, 2009). The most common reasons given for not using either technology were labor, time, cost, and difficulty in implementation (USDA, 2009). The cost of these reproductive technologies can be recovered through increased numbers of calves born earlier in the calving season, resulting in heavier calves at weaning, longer postpartum periods for

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rebreeding, and the opportunity to use semen from high-accuracy sires (Johnson, 2005). The CO-Synch + controlled internal drug-release device (**CIDR**) protocols that use fixed-time AI (**TAI**) have reduced time and labor costs associated with estrus detection programs while maintaining similar pregnancy rates (Larson et al., 2006). Pregnancy rates with TAI have ranged from 43 to 74% (Lauderdale, 2009); however, having >40% of cows not conceiving at TAI suggests there is room for improvement in synchronization protocols. Administering 2 injections of prostaglandin (**PG**) $F_{2\alpha}$ compared with 1 in a 5-d CO-Synch + CIDR protocol increased TAI pregnancy rates by 17 percentage units (Kasimanickam et al., 2009), and shortening the time the CIDR was in place from 7 to 5 d in CO-Synch + CIDR protocols increased TAI pregnancy rates by 9 to 13 percentage units (Bridges et al., 2008). Both of these studies administered 2 injections of $PGF_{2\alpha}$ with a 7-h (Kasimanickam et al., 2009) or 12-h interval (Bridges et al., 2008); however, few researchers have evaluated the most effective time interval between $PGF_{2\alpha}$ injections in a single experiment. The objectives of the current study were to compare the effect of 6- versus 12-h intervals between $PGF_{2\alpha}$ injections in a 5-d CO-Synch + CIDR protocol on TAI pregnancy rates and to compare the 5-d CO-Synch + CIDR protocols with 2 $PGF_{2\alpha}$ injections with a 7-d CO-Synch + CIDR protocol with 1 $PGF_{2\alpha}$ injection.

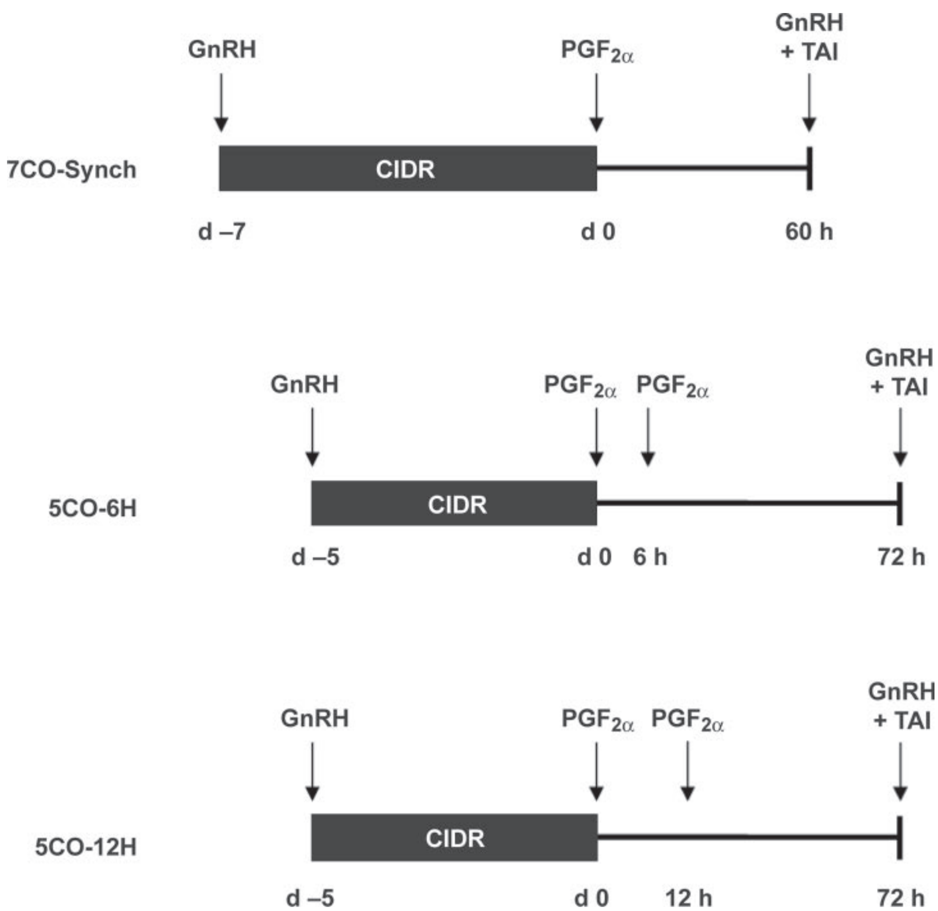

Figure 1. Diagram of treatment protocols used to synchronize estrus and ovulation in beef cows. 7CO-Synch = gonadotropin-releasing hormone (GnRH; 100 μg of gonadorelin diacetate tetrahydrate in 2 mL of Cystorelin sterile saline, Merial Limited, Duluth, GA) and controlled internal drug-release insert [CIDR; EAZI-Breed CIDR (progesterone) cattle insert, Pfizer Animal Health, New York, NY] on d −7, removal of the CIDR and 1 injection of prostaglandin (PG) $F_{2\alpha}$ [25 mg dinoprost tromethamine ($PGF_{2\alpha}$) in 5 mL of Lutalyse sterile saline solution, Pfizer Animal Health, New York, NY] on d 0, and GnRH with timed AI (TAI) at 60 h; 5CO-6H = GnRH and CIDR on d −5, $PGF_{2\alpha}$ at 0 and 6 h after removal of the CIDR on d 0, and GnRH with TAI at 72 h; 5CO-12H = GnRH injection and CIDR on d −5, $PGF_{2\alpha}$ at 0 and 12 h after removal of the CIDR on d 0, and GnRH with TAI at 72 h.

MATERIALS AND METHODS

This experiment was conducted following Colorado State University Animal Care and Use Committee guidelines and regulations. Two ranches were used for this study: ranch 1, a producer-owned herd, had 263 mixed commercial and seedstock Angus cows, and ranch 2, a Colorado State University herd in Saratoga, Wyoming, had 397 seedstock Angus cows. Lactating beef cows were assigned into 1 of 3 treatment groups (Figure 1): 1) control (**7CO-Synch**) cows received 100 μg of gonadorelin diacetate tetrahydrate (**GnRH**) in 2 mL of Cystorelin sterile saline (Merial Limited, Duluth, GA) and a CIDR [EAZI-Breed CIDR (progesterone) cattle insert, Pfizer Animal Health, New York, NY] on d −7, 25 mg dinoprost tromethamine (Lutalyse) in 5 mL of sterile saline solution (Pfizer Animal Health, New York, NY) concomitant with removal of the CIDR on d 0, and a second injection of GnRH and TAI at 60 h; 2) **5CO-6H** cows received GnRH and a CIDR on d −5, $PGF_{2\alpha}$ at 0 and 6 h after removal of the CIDR on d 0, and a second injection of GnRH and TAI at 72 h; 3) **5CO-12H** cows received GnRH and a CIDR on d −5, $PGF_{2\alpha}$ at 0 and 12 h after removal of the CIDR on d 0, and a second injection of GnRH and TAI at 72 h.

At both ranch 1 and ranch 2, all animals were managed similarly before and after synchronization and breeding. However, at ranch 1, first-calf heifers were supplemented with minimal energy from calving until immediately before initiating treatments. Throughout the calving period at both locations, cow-calf pairs were sorted into groups of approximately 75 pairs based on the age of the calf so that older calves did not contami-