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Effect of Calf Separation During the 12-Hour Interval Between 2 Prostaglandin $F_{2\alpha}$ Injections When Using the 5-Day CO-Synch + Controlled Internal Drug-Release Synchronization Protocol on Pregnancy Rate in Beef Cows

R. K. Peel,* J. K. Ahola,* W. D. Whittier,† J. C. Whittier,*[1] PAS, and A. V. Grove‡
*Department of Animal Sciences, Colorado State University, Fort Collins 80523; †Department of Large Animal Clinical Sciences, Virginia-Maryland College of Veterinary Medicine, Virginia Polytechnic Institute and State University, Blacksburg 24061; and ‡AG Research LLC, White Sulphur Springs, MT 59645

ABSTRACT

The objective of this study was to determine the effect of calf separation during the 12-h interval between 2 prostaglandin $F_{2\alpha}$ (PG) injections on fixed-time AI (TAI) pregnancy rate in beef cows synchronized with a 5-d CO-Synch + controlled internal drug-release device (CIDR) protocol. This study was conducted at 2 locations using 319 cows of Angus, Limousin, and Hereford breeding at ranch 1, and 108 Angus-based cows at ranch 2. All cows were synchronized with gonadotropin-releasing hormone and CIDR on d −5, with 25 mg of PG at 0 and 12 h after removal of CIDR on d 0, and with gonadotropin-releasing hormone with TAI at 72 h. At each ranch, half the calves remained separated from cows during the 12-h interval between PG injections and the other half of the calves were returned to their dams during this time. Body condition score was greater ($P < 0.01$) for cows with calves returned to their dams at ranch 2 (BCS 5.3) than for the other 3 treatment groups (average BCS 5.0). Interval from calving to breeding did not differ ($P > 0.68$) between ranches or calf treatments, averaging 80 d. Timed AI pregnancy rate and early-season pregnancy rate were greater ($P < 0.01$) at ranch 2 than ranch 1 (69.6 vs. 53.4% and 87.9 vs. 67.2%, respectively). Timed AI pregnancy rate and early-season pregnancy rate did not differ ($P > 0.48$) between the half of calves returned to their dams during this time and the other half of calves separated from cows, averaging 61.5 and 77.5%, respectively. Calf separation during the 12-h interval between PG injections had no effect on TAI pregnancy rate, but would simplify the application of this synchronization protocol.

Key words: controlled internal drug-release device, estrous syn-

[1] Corresponding author: jack.whittier@colostate.edu

chronization, gonadotropin-releasing hormone, prostaglandin $F_{2\alpha}$, timed artificial insemination

INTRODUCTION

Use of controlled internal drug-release inserts (**CIDR**), along with injections of gondadotropin-releasing hormone (**GnRH**) and prostaglandin $F_{2\alpha}$ (**PG**) have improved the ability to achieve high pregnancy rates in beef cows when artificially inseminated at a preset time (**TAI**; Lamb et al., 2010). A TAI protocol known as the 5-d CO-Synch + CIDR protocol has been developed over the past 7 yr and is now a recommended TAI protocol for lactating beef cows (Beef Reproduction Task Force, 2010). The 5-d CO-Synch + CIDR approach has increased TAI pregnancy rate by more than 10 percentage units compared with the traditional 7-d CO-Synch + CIDR system (Bridges et al., 2008). The increase in pregnancy rates with the 5-d protocol has been achieved by administering 2 injections of PG after removal of CIDR after 5 d in the CO-Synch + CIDR protocols (Kasimanickam et al., 2009). These researchers administered 2 injections of PG to ensure complete luteolysis of the corpus luteum because of the shorter 5-d interval between the initial injections of GnRH and PG (Kasimanickam et al., 2009). Others reported that 2 injections of PG increased the number of dairy cows observed in estrus within 5 to 7 d (Archbald et al., 1993; Répási et al., 2005) and the number conceiving (Répási et al., 2005) compared with cows receiving only 1 PG injection. This protocol is more labor intensive, requiring an additional episode of handling cows and calves, along with the added expense of another injection. Kasimanickam et al. (2009) reported a 17 percentage unit increase in TAI pregnancy rate with 2 PG injections, which may make the additional time and costs associated with this procedure cost effective. When giving 2 injections of PG with the 5-d CO-Synch + CIDR protocol, the question of how to manage the nursing calves during the interval between injections has arisen. To avoid injury to calves when processing lactating beef cows, it is typical to separate cows from calves before removal of the CIDR insert and the protocol injections. If no adverse effect were to be found from having the calves remain separated during the interval between the first and second PG injections, it would alleviate additional sorting and thereby simplify the protocol. Conversely, short-term calf removal has improved TAI pregnancy rates of CO-Synch protocols (Geary et al., 2001b; Kesler et al., 2008). During the early investigations of the 5-d CO-Synch + CIDR protocol, researchers were concerned that if there were a positive effect of calf separation during this interval, it may have a confounding effect on the results of the initial studies. Therefore, in earlier studies with this 5-d system, calves were returned to the cows after the first PG injection, and then separated again to administer the second PG injection to the cows. Williams (1996) investigated the mechanism regulating ovulation associated with acute weaning of suckled beef cows and reported that a short-term calf removal period of 48 h or more was required to cause physiological events necessary to affect ovulation. We hypothesized that the shorter 12-h duration of calf separation in the 5-d CO-Synch + CIDR system would not be long enough to elicit a physiological effect and would not affect TAI pregnancy rates. Therefore, the objective of this study was to evaluate the effect of calf separation during a 12-h interval between 2 PG injections after CIDR removal on TAI pregnancy rates in beef cows synchronized with a 5-d CO-Synch + CIDR protocol as a means of simplifying the implementation of the protocol.

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 Colorado State University herd in Akron, Colorado, had 319 cows of primarily Angus breeding, with some Limousin and Hereford genetics, and ranch 2, a producer-owned herd in Dublin, Virginia, had 108 crossbred cows. The multiparous, lactating cows at both ranches were randomized based on BCS and interval from calving into 1 of 2 treatment groups. Both treatment groups were synchronized using a 5-d CO-Synch + CIDR protocol: 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 −5, 25 mg of dinoprost tromethamine (PG) in 5 mL of Lutalyse sterile saline solution (Pfizer Animal Health, New York, NY) at 0 and 12 h after removal of the CIDR on d 0, and a second injection of GnRH and TAI at 72 h. Calves in 1 treatment group (**CALFSEP**) were separated from cows on d 0 before processing for CIDR insert removal and first PG injection. The calves were held in a nearby secure pen with dry hay and water available and were returned to their dams after the second PG injection 12 h later. During the separation period, the cows at both ranches were placed on nearby pastures for grazing and could both see and hear the calves. Calves in the second treatment group (**CALFRET**) were separated from cows on d 0 before processing, returned to their dams after CIDR removal and the first PG injection, reseparated so that their dams could be processed for the second PG injection 12 h later, and returned to their dams after the second PG injection. Cows and calves in the CALFRET group were placed on pastures similar to, but separate from, those of the CALFSEP group during the 12-h interval between PG injections. There was no direct access of the CALFRET calves to the CALFSEP cows during this period.

At both locations, cows were managed as 1 group, with the same feeding and grazing management during the entire study period. Cows