Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 13

2012

Presynchronizing Prostaglandin F2α injection before timed artificial insemination CO-Synch + CIDR program

Scott L. Hill

Stephanie Leeann Pulley

H.I. Jr. Mellieon

See next page for additional authors

Recommended Citation

Hill, Scott L.; Pulley, Stephanie Leeann; Mellieon, H.I. Jr.; Olson, K. C.; Jaeger, John R.; Breiner, Ryan M.; Perry, G.A.; Lamb, G.C.; and Stevenson, Jeffrey S. (2012) "Presynchronizing Prostaglandin F2α injection before timed artificial insemination CO-Synch + CIDR program," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. https://doi.org/10.4148/2378-5977.1416

Presynchronizing Prostaglandin F2α injection before timed artificial insemination CO-Synch + CIDR program

Abstract

Fixed-time artificial insemination is an effective management tool that reduces the labor associated with more conventional programs that require detection of estrus. The 7-day CO-Synch + controlled internal drug release (CIDR) insert protocol has been shown to effectively initiate estrus and ovulation in cycling and non-cycling suckled beef cows, producing pregnancy rates at or greater than 50% in beef cows. The gonadotropin- releasing hormone (GnRH) injection that begins the CO-Synch + CIDR program initiates ovulation in a large proportion of cows, particularly anestrous cows. The CIDR, which releases progesterone intravaginally, prevents short estrous cycles that usually follow the first postpartum ovulation in beef cows. Our hypothesis was that inducing estrus with a prostaglandin injection 3 days before applying the 7-day CO-Synch + CIDR protocol might increase the percentage of cycling cows that would exhibit synchronous follicular waves after the onset of the CO-Synch + CIDR protocol, thereby increasing pregnancy outcomes.

Keywords

Cattlemen's Day, 2012; Kansas Agricultural Experiment Station contribution; no. 12-231-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1065; Beef Cattle Research, 2012 is known as Cattlemen's Day, 2012; Beef; Prostaglandin F2α; Timed A.I.; CO-Synch + CIDR

Authors

Scott L. Hill, Stephanie Leeann Pulley, H.I. Jr. Mellieon, K. C. Olson, John R. Jaeger, Ryan M. Breiner, G.A. Perry, G.C. Lamb, and Jeffrey S. Stevenson

Presynchronizing Prostaglandin $F_{2\alpha}$ Injection before Timed Artificial Insemination CO-Synch + CIDR Program

S.L. Hill, S.L. Pulley, H.I. Mellieon, Jr., KC Olson, J.R. Jaeger, R.A. Breiner, G.A. Perry[1], G.C. Lamb[2], and J.S. Stevenson

Introduction

Fixed-time artificial insemination is an effective management tool that reduces the labor associated with more conventional programs that require detection of estrus. The 7-day CO-Synch + controlled internal drug release (CIDR) insert protocol has been shown to effectively initiate estrus and ovulation in cycling and non-cycling suckled beef cows, producing pregnancy rates at or greater than 50% in beef cows. The gonadotropin-releasing hormone (GnRH) injection that begins the CO-Synch + CIDR program initiates ovulation in a large proportion of cows, particularly anestrous cows. The CIDR, which releases progesterone intravaginally, prevents short estrous cycles that usually follow the first postpartum ovulation in beef cows. Our hypothesis was that inducing estrus with a prostaglandin injection 3 days before applying the 7-day CO-Synch + CIDR protocol might increase the percentage of cycling cows that would exhibit synchronous follicular waves after the onset of the CO-Synch + CIDR protocol, thereby increasing pregnancy outcomes.

Experimental Procedures

A total of 1,537 primiparous and multiparous cows from 9 locations in 4 states (Florida, Georgia, Kansas, and South Dakota) were enrolled in this study. Characteristics of suckled beef cows enrolled by location are summarized in Table 1. Cows were stratified by breed, days postpartum, and parity, then assigned randomly to either of 2 treatments. Control cows received the standard CO-Synch +CIDR program (100 μg GnRH; 2 mL Factrel; Pfizer Animal Health, Whitehouse Station, NJ) 7 days before and 72 hours after 25 mg prostaglandin $F_{2\alpha}$ [PG; 5 mL Lutalyse; Pfizer Animal Health). A new CIDR insert (Pfizer Animal Health) containing 1.38 g progesterone was placed intravaginally at the time of the first GnRH injection (day -10). Treated cows (Figure 1) received 25 mg PG 3 days before (day -13) the CO-Synch + CIDR program began.

Body condition scores (1 = thin; 9 = very fat) were assigned at the time PG $F_{2\alpha}$ was administered to the experimental group on day -13. Estrus-detection patches (Estrotect, Rockway, Inc., Spring Valley, WI) were affixed to all cows. Estrus-detection patches were removed on day -10 and scored (0 = not colored, 1 = partially colored, and 2 = completely colored). On day -3 CIDR inserts were removed, a second estrus-detection patch was applied, and PG was administered to all cows in both treatments. Only 3.6% of patches were scored as 1 (partially colored) by d -10 (3 days after the treatment PG injection) and 5.5% of patches were scored as 1 at the timed artificial insemination. Therefore, we eliminated those cows with patch scores of 1 and assumed that cows with

[1] Department of Animal Science, South Dakota State University, Brookings.
[2] Department of Animal Science, North Florida Research and Education Center, University of Florida, Marianna.

patch scores of 0 did not show estrus, whereas those with completely colored patches had been mounted and were in estrus sometime after the PG injections.

Blood samples were collected via caudal vessel puncture at days -23, -13, -10, -3, and 0. Samples were assayed for progesterone using radioimmunoassay. Cows with blood progesterone >0.95 ng/mL on days -23, -13, or -10 or that had a completely colored estrus-detection patch on day -10 were assumed to have reestablished estrous cycles and were classified as cycling. The sample collected at day -3 reflected progesterone concentrations resulting from the CIDR insert, a functional corpus luteum, or both.

Artificial insemination was performed 72 hours after CIDR insert removal on day 0, and estrus-detection patches were removed and scored. Cows were either exposed to cleanup bulls 10 to 12 days later or reinseminated at subsequent estrus. At 35 days after artificial insemination, pregnancy was confirmed by transrectal ultrasonography (Aloka 500V, 5MHz transrectal transducer, Wallingford, CT). A positive pregnancy outcome required the presence of a corpus luteum and uterine fluid or uterine fluid and an embryo with a heartbeat. A final pregnancy diagnosis was determined 35 days after the end of the breeding season via transrectal ultrasonography. Embryonic losses in cows that conceived to the timed artificial insemination were determined at that time.

Results and Discussion

Cyclicity in the cows averaged 44.7% (range 16.4 to 69.5%) across the nine locations at the beginning of the protocol (Table 1). The percentage of primiparous cows varied by location (0.7 to 37.8%). Average body condition score ranged from 4.3 to 6.0. Multiparous cows treated with PG on day -13 had a greater ($P < 0.05$) incidence of estrus after both $PGF_{2\alpha}$ injections than primiparous cows in both treatments and other multiparous control cows (Figure 2), indicating that more multiparous cows were cycling and responded to PG. Based on the estrus response, an alternative breeding option with the PG treatment could include inseminating cows detected in estrus after the PG injection and apply the timed artificial insemination option to all remaining cows.

Consistency in timed artificial insemination pregnancy outcome among locations was observed with acceptable pregnancy rates >50% at all but one location in both treated and control cows (Figure 3). Pregnancy rates at day 35 and at the end of the breeding season did not differ between treatments (Table 2). Pregnancy loss of cows conceiving at the timed artificial insemination was minimal (<2%) between day 35 of pregnancy and the end of the breeding season. Pregnancy rates at day 35 (60.0 versus 47.7%) and at the end of the breeding season (96.2 versus 92.3%) were greater ($P < 0.001$) for multiparous than primiparous cows, respectively. Body condition score of cows had no effect on pregnancy outcomes.

Implications

Results indicate that the PG treatment and control are equally effective fixed-time artificial insemination protocols even in herds with a large percentage of anestrous cows. Both of these protocols were more effective in multiparous than primiparous cows in terms of greater pregnancy rate after timed artificial insemination. The PG treatment resulted in more visible estrus in multiparous cows. Results may differ if cows detected

in estrus after the first PG injection were inseminated and timed artificial insemination were applied to the remaining cows.

Table 1. Location characteristics of suckled beef cows enrolled in the study

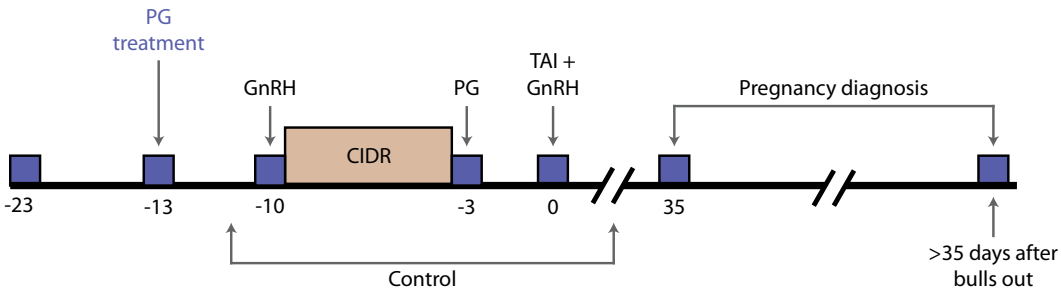
Location	Breed	No. of cows	2-year-olds, %	Days postpartum at artificial insemination[1]	Body condition[1]	Cyclicity, %
FL-1	Angus, Charolais, Brangus	228	10.5	69 ± 0.7	5.0 ± .03	...[2]
FL-2	Angus, Charolais, Brangus	146	8.2	54 ± 0.5	5.3 ± .04	...[2]
GA-1	Angus	126	21.4	75 ± 0.8	5.0 ± .06	65.1
KS-H	Angus × Hereford	195	25.1	80 ± 1.2	5.7 ± .05	53.3
KS-C	Angus × Hereford	205	27.8	71 ± 0.7	6.0 ± .03	50.2
KS-P	Angus, Hereford, Simmental	167	27.0	69 ± 1.2	5.2 ± .05	69.5
SD-A	Angus × Hereford	222	37.8	74 ± 1.1	4.4 ± .03	22.7
SD-C	Angus × Hereford	104	31.1	75 ± 2.1	4.9 ± .06	36.5
SD-CT	Angus × Hereford	144	0.7	67 ± 0.9	4.3 ± .04	16.4

[1] Mean ± SE.
[2] No blood samples were collected at these locations.

Table 2. Pregnancy rates based on treatment, parity, and body condition score

Item	Treatment[1]	
	Control	PG + CO-Synch + CIDR
	----- % (n) -----	
Timed artificial insemination 35-day pregnancy rate, %	52.2 (770)	55.6 (766)
Final pregnancy rate, %	93.8 (766)	95.2 (764)
Pregnancy loss, %	1.4 (427)	1.4 (451)
Parity[2]		
1 (primiparous)	45.7 (165)	49.8 (166)
≥2 (multiparous)	58.6 (605)	61.4 (600)
Body condition score[3]		
≤5	53.0 (455)	55.8 (463)
>5	51.2 (315)	55.7 (303)

[1] See Figure 1 for description of treatments.
[2] Multiparous cows had greater ($P < 0.001$) pregnancy rates than primiparous cows.
[3] 1 = thin, 9 = very fat.



GnRH = gonadotropin-releasing hormone (Factrel); PG = prostaglandin $F_{2\alpha}$ (Lutalyse);
CIDR = controlled internal drug release containing progesterone; TAI = timed artificial insemination.

Figure 1. Experimental protocol illustrating sequence of treatments and measurements.

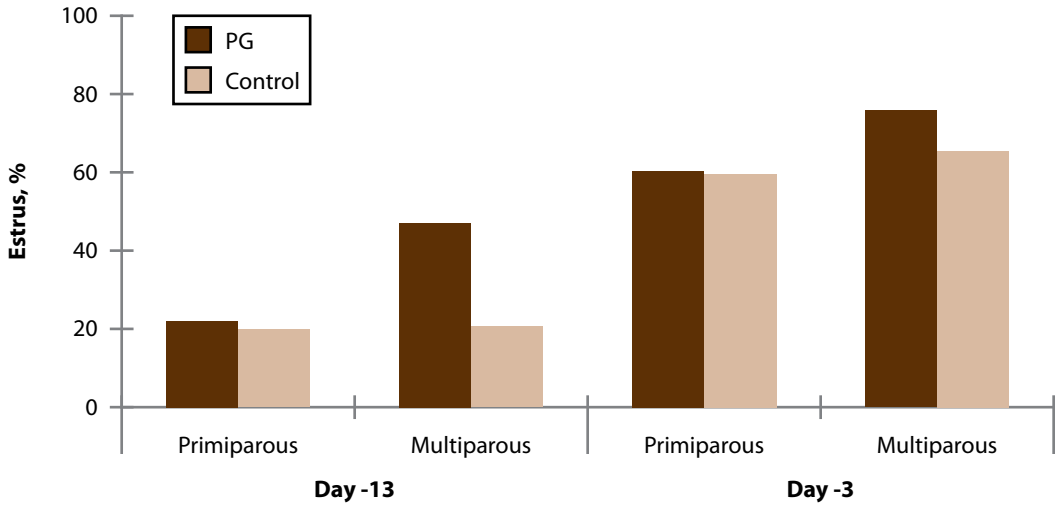


Figure 2. Percentage of cows exhibiting estrus by 72 hours after prostaglandin $F_{2\alpha}$ (PG) injections on day -13 and day -3.

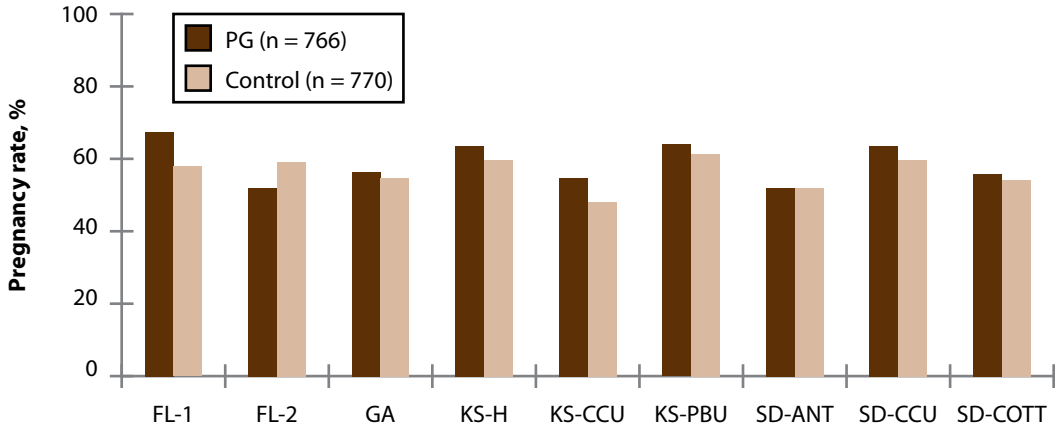


Figure 3. Unadjusted pregnancy rates after timed artificial insemination for cows at 9 locations in 4 states.