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Long-Term CIDR Program for Synchronization of Estrus in Beef Heifers Produces Acceptable AI Pregnancy Rates

S.K. Johnson, J.R. Jaeger, and J.W. Bolte

Introduction

Routinely achieving pregnancy rates greater than 50% with fixed-time artificial insemination (AI) in heifers has been difficult. The Beef Reproduction Task Force recently added the intravaginal progesterone-releasing device (CIDR)-Select to its list of recommended fixed-time AI protocols. Research and field trials in Missouri have achieved AI pregnancy rates in the range of 55% to 60%. Another relatively new protocol is the 5-day CO-Synch, a timed AI protocol + CIDR that has produced pregnancy rates similar to or higher than those obtained with the standard 7-day CO-Synch + CIDR protocol. It is not known whether these two systems differ in terms of estrous response. The objective of the current study was to compare effects of a long-term, 14-day CIDR-Select protocol and a 5-day CO-Synch + CIDR protocol on estrous distribution and AI pregnancy rate in yearling beef heifers.

Experimental Procedures

In 2008 (n = 69) and 2009 (n = 74), Angus and Angus cross yearling heifers were assigned to one of two treatments on the basis of age and weight. Heifers assigned to the CIDR-Select protocol (Figure 1) received an EAZI-BREED CIDR insert (1.38 g, Pfizer Animal Health, New York, NY) from day -30 through day -16, 2 mL Fertagyl (gonadotropin-releasing hormone; Intervet-Schering Plough Animal Health, De Soto, KS) intramuscularly on day -7, and 5 mL Prostamate (prostaglandin $F_{2\alpha}$; Teva Animal Health, St. Joseph, MO) intramuscularly on day 0. Heifers assigned to the 5-day CO-Synch + CIDR protocol (Figure 1) received a CIDR insert and 2 mL Fertagyl intramuscularly on day -5 and 5 mL Prostamate intramuscularly and CIDR removal on day 0. On day 0, heifers received either an Estrotect patch (Estrotect, Inc., Spring Valley, WI; 2008) or a Kamar patch (Kamar, Inc., Steamboat Springs, CO; 2009). Heifers were observed at least twice daily for estrus until 60 hours after Prostamate injection. Heifers observed in estrus prior to 60 hours were inseminated using the AM/PM rule. At 72 hours, all heifers not previously observed in estrus were inseminated and received 2 mL Fertagyl intramuscularly (clean-up timed AI). Bulls were introduced at least 10 days after timed-AI. Pregnancy to AI was determined by transrectal ultrasonography between 28 and 35 days after AI.

Serum samples for determination of progesterone concentrations were collected 10 days before and at the start of each treatment. Heifers with progesterone concentrations greater than or equal to 1 ng/mL in one or both samples were considered cycling.

Results and Discussion

Heifers were younger ($P<0.05$) on day 0 in 2009 than in 2008 (13.6 vs. 14.6 months, respectively; Table 1). A majority of heifers were cycling prior to initiation of treatments, and the proportion did not differ with treatment or year.

Interval to estrus was longer (P<0.01) in 2008 than in 2009 (63.4 ± 1.5 hours and 55.9 ± 1.9 hours, respectively). There was no difference in interval to estrus due to treatment (60.6 ± 1.4 hours and 58.6 ± 1.4 hours for CIDR-Select and 5-day CO-Synch + CIDR, respectively). The proportion of heifers displaying estrus by 60 hours after Prostamate injection was 34% (48/143) and did not differ with treatment.

Conception rate after observed estrus was higher (P<0.01) for CIDR-Select than for 5-day CO-Synch + CIDR, as was pregnancy rate to clean-up timed AI and overall AI pregnancy rate (Table 2). Final pregnancy rate was 82% and 90% for CIDR-Select and 5-day CO-Synch + CIDR, respectively, and did not differ between estrous synchronization treatments.

This is one of the first studies to show a lower conception rate after observed estrus following a 5-day CO-Synch + CIDR protocol compared with other synchronization treatments. Most available data compares fixed-time AI pregnancy rate of the 5-day CO-Synch + CIDR protocol with that of the standard 7-day treatment protocol. Pregnancy rate to AI after the 5-day protocol has either been equal to or greater than that in the 7-day protocol. In some of those studies, a second injection of prostaglandin (Prostamate in this study) was administered 12 hours after the first injection at the time of CIDR removal. Two injections of prostaglandin have been used to ensure regression of corpora lutea induced by the gonadotropin-releasing hormone injection administered at CIDR insertion. If luteal regression had been deficient in this study, the estrus response or interval to estrus may have been affected, but that was not the case. The relatively low number of heifers per treatment in this study and the amount of data from other studies with much higher conception rates suggests the poor pregnancy rate in the 5-day treatment may be a result of small treatment groups and the challenges presented by variation of categorical (yes/no) data.

Implications

The CIDR-Select protocol for synchronization of estrus and ovulation in beef heifers results in industry-acceptable pregnancy rates; however, the need to handle animals five times may limit its application.

Table 1. Characteristics of heifers

Year	Treatment	n	Age, days	Cycling, %
2008	CIDR-Select	35	438 ± 3.2	97
	5-day CO-Synch + CIDR	34	437 ± 3.2	94.3
			438 ± 2.2	96
2009	CIDR-Select	37	411 ± 3.1	86.5
	5-day CO-Synch + CIDR	37	409 ± 3.1	97.3
			410 ± 2.2	92

Table 2. Conception rate to estrus AI, pregnancy rate to clean-up fixed-time AI, and overall AI pregnancy rate in beef heifers[1]

Treatment	Conception rate, estrus AI, % (n)	Pregnancy rate, clean-up fixed-time AI, % (n)	AI pregnancy rate, % (n)
CIDR-Select	78[a] (23)	61[a] (49)	67[a] (72)
5-day CO-Synch + CIDR	32[b] (25)	37[b] (46)	35[b] (71)

[1] AI, artificial insemination.
Means within columns with a different superscript letter differ (P<0.05).

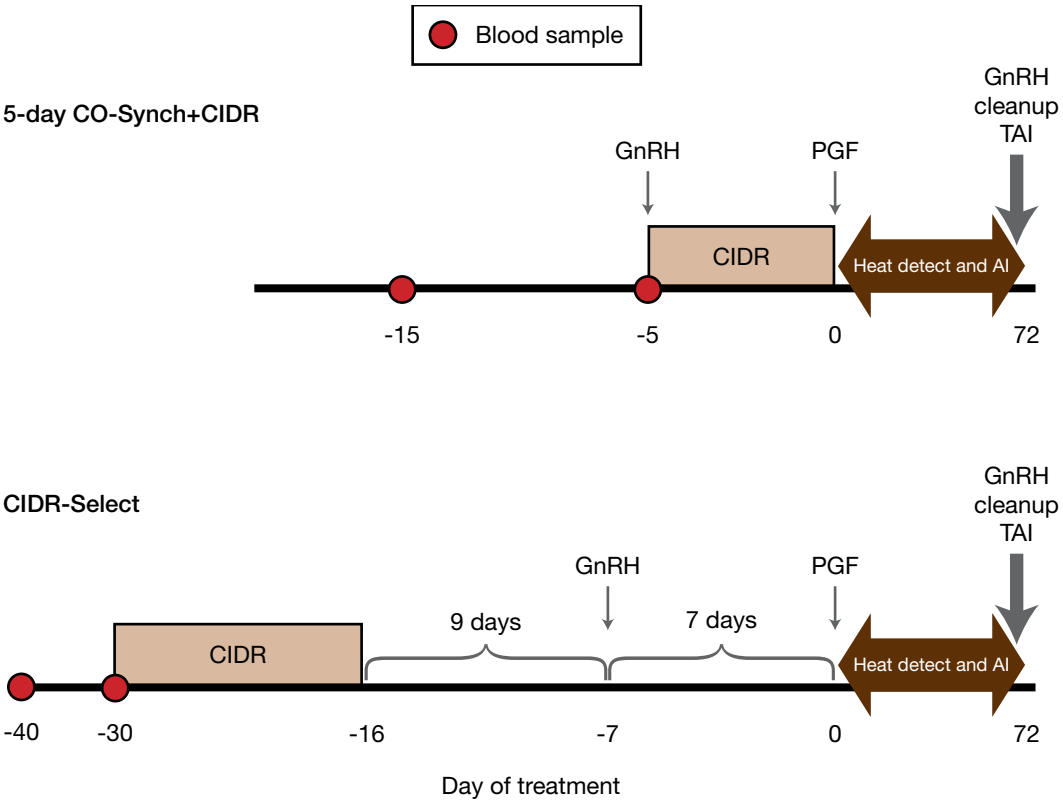

Figure 1. Description of treatments.
GnRH, gonadotropin-releasing hormone (Fertagyl); PGF, prostaglandin $F_{2\alpha}$ (Prostamate); CIDR, intravaginal progesterone-releasing device (EAZI-BREED CIDR).