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Abstract

Lactating beef cows (n=360) were synchronized using the Cosynch procedure; 100 Î¼g of GnRH (day −7) followed in 7 days by 25 mg of PGF2α(day 0). A used intravaginal progesterone insert (CIDR-B) was inserted on day −7 and removed at the time of PGF2αadministration. Cows were assigned to a 2 x 2 factorial arrangement of four treatments: 1) insemination beginning at 48 vs. 60 hours after PGF2αand 2) administration of a second, 100 Î¼g injection of GnRH or an equivalent volume of saline immediately after timed AI. Timed AI at either 48 or 60 hours after PGF2αin a Cosynch + CIDR protocol was equally effective. Administration of GnRH at timed AI improved conception in all cycling cows and in some noncycling cows, depending on their progesterone status.

Keywords

Cattlemen's Day, 2002; Kansas Agricultural Experiment Station contribution; no. 02-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 890; Beef; Ovulation synchronization; Beef cows; Timed AI; GnRH; CIDR

TIMED INSEMINATION OF SUCKLED BEEF COWS AFTER OVULATION SYNCHRONIZATION WITH COSYNCH + CIDR

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Summary

Lactating beef cows (n=360) were synchronized using the Cosynch procedure; 100 μg of GnRH (day −7) followed in 7 days by 25 mg of $PGF_{2\alpha}$ (day 0). A used intravaginal progesterone insert (CIDR-B) was inserted on day −7 and removed at the time of $PGF_{2\alpha}$ administration. Cows were assigned to a 2 × 2 factorial arrangement of four treatments: 1) insemination beginning at 48 vs. 60 hours after $PGF_{2\alpha}$ and 2) administration of a second, 100 μg injection of GnRH or an equivalent volume of saline immediately after timed AI. Timed AI at either 48 or 60 hours after $PGF_{2\alpha}$ in a Cosynch + CIDR protocol was equally effective. Administration of GnRH at timed AI improved conception in all cycling cows and in some noncycling cows, depending on their progesterone status.

(Key Words: Ovulation Synchronization, Beef Cows, Timed AI, GnRH, CIDR.)

Introduction

Pregnancy rates to timed AI of 40 to 50% are reported for the Cosynch synchronization protocol; a GnRH injection on a Monday, $PGF_{2\alpha}$ on the following Monday, and GnRH plus timed AI on Wednesday (48 hours after $PGF_{2\alpha}$). Cosynch was adapted from the Ovsynch protocol developed earlier for dairy cows in which AI is performed 16 hours after the second GnRH injection.

In general, beef herds have more problems than dairy herdswith cows that are anestrus prior to the beginning of the breeding season and estrus synchronization. We also know that the interval between $PGF_{2\alpha}$ injection and estrus is longer in cycling than anestrous cows. Incorporation of an intravaginal progesterone insert (CIDR) into the Cosynch protocol is beneficial because it prevents heat expression prior to $PGF_{2\alpha}$ (first day of the breeding season). However, it may also prolong the onset of estrus. Thus, breeding 48 hours after $PGF_{2\alpha}$ in the Cosynch + CIDR protocol may not be optimal in beef herds.

GnRH is given at timed AI to initiate an LH surge. This GnRH injection may not be necessary to achieve acceptable pregnancy rates when the CIDR is used. The benefit of GnRH at timed AI may depend on whether or not the cow has resumed normal estrous cycles before $PGF_{2\alpha}$, and on the interval between $PGF_{2\alpha}$ and timed AI.

Experimental Procedures

In the spring of 2001, lactating beef cows from two Kansas herds were studied (Table 1). Purebred Angus, Simmental, and Hereford cows (n=146) were used at the Kansas State University Purebred Beef Unit (PBU) in Manhattan and crossbred Angus cows (n=214) were used at the Agriculture Research Center in Hays (ARCH). One ovula-

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tion-synchronization protocol (Cosynch) was used in which all cows were administered (day −7)100 μg of GnRH (i.m., Factrel7, Fort Dodge) followed in 7 days (day 0) by 25 mg of $PGF_{2\alpha}$ (i.m.; Lutalyse7, Pharmacia Animal Health). A used intravaginal progesterone insert (CIDR-B) was inserted on day −7 and removed at the time of $PGF_{2\alpha}$ administration (Figure 1). Cows were blocked by breed, calving date, and parity and assigned randomly to a 2 × 2 factorial arrangement of four treatments: 1) insemination beginning at either 48 or 60 hours after $PGF_{2\alpha}$; and 2) a second, 100-μg injection of GnRH or an equivalent volume of saline immediately after timed AI. Therefore, the four treatments were: 48+saline, 48+GnRH, 60+saline, and 60+GnRH.

Blood samples were collected on days −14, −7, 0, and before timed insemination for later analysis of progesterone. Cows with serum progesterone concentrations ≥1 ng/mL on day −14 and/or day −7 were assumed to have resumed normal estrous cycles (cycling), whereas cows with progesterone concentrations <1 ng/mL on both days −14 and −7 were classified as noncycling. Pregnancy rate after the timed insemination was determined 35-36 days after timed AI via transrectal ultrasonography.

Results and Discussion

Pregnancy rates were not different in cows inseminated at 48 or 60 hours after $PGF_{2\alpha}$ (80/179 [45%] vs. 87/181 [48%], respectively). This was true regardless of whether cows were classified as cycling or noncycling before the initiation of treatments (Figure 2). Lack of differences in pregnancy rates between the 48 and 60 hour groups indicates a fairly broad window for optimal timing of insemination.

Administration of GnRH after timed AI tended ($P = 0.12$) to increase pregnancy rates compared to administration of saline (90/178 [51%] vs. 77/182 [42%], respectively). Cycling cows receiving GnRH had greater pregnancy rates than those receiving saline (51% vs. 38%, respectively, Figure 3). Pregnancy rates were similar for cows not cycling at the beginning of the breeding season, regardless of GnRH or saline treatment.

Cycling cows with concentrations of progesterone ≥1 ng/ml on day 0 (indicating the presence of a corpus luteum) and those with concentrations of progesterone <1 ng/ml at insemination (corpus luteum regressed in response to $PGF_{2\alpha}$) had greater ($P<0.05$) pregnancy rates when they received GnRH compared to saline-injected controls (49/86 [57%] vs. 36/93 [39%], respectively).

Treatment with GnRH vs. saline at insemination did not influence pregnancy rates in noncycling cows with progesterone ≥1 ng/ml on day 0 and progesterone <1 ng/ml at insemination (24/51 [47%] vs. 28/49 [57%], respectively). Noncycling cows with concentrations of progesterone deviating above baseline on day 0 by 0.4 to 0.9 ng/mL had greater ($P<0.05$) pregnancy rates if GnRH (vs. saline) was given at insemination (10/16 [63%] vs. 5/19 [26%], respectively). This small increase in progesterone was likely due to the presence of the CIDR alone and not due to the presence of luteal tissue. Thus, noncycling cows that ovulated in response to the first GnRH injection do not seem to benefit from GnRH at timed AI. In contrast, GnRH given at timed AI benefitted those noncycling cows that did not respond to the first injection of GnRH but had enough progesterone from the CIDR so that when the CIDR was removed an ovulatory follicle developed.

Benefits of GnRH at timed AI seem to depend on cycling status and the stage of cycle when treatment is initiated. Trying to predict the proportion of cows cycling or the proportion at various stages of the cycle prior to synchronization is not practical. Thus, a producer's decision to use GnRH at timed AI may depend on the added value of earlier pregnancies, cost of GnRH, and some estimation of the proportion of cows cycling. Another way to view the GnRH injection given at timed AI is as added insurance on the existing investment in the synchronization protocol. Knowledge of which "types" of cows seem to benefit from various treatments may help us design better treatments in the future.

Timed AI at either 48 or 60 hours after $PGF_{2\alpha}$ in a Cosynch + CIDR protocol was equally effective. Administration of GnRH at timed AI improved conception in all cycling cows and also in some noncycling cows, depending on their progesterone status.

Table 1. Characteristics of Herds in Study

Herd	No.	BCS[1]	Days Postpartum[2]	% Cycling[3]	No.	BCS	Days Postpartum	% Cycling
PBU[4]	100	5.5 ± .1	69 ± 1.5	80	46	5.0 ± .1	93 ± 3.0	72
ARCH[5]	214	4.3 ± .1	60 ± 1.5	46				

[1]Body condition score assessed at the onset of the breeding season. [2]Days postpartum at the onset of the breeding season. [3]Percentage of cows that had resumed estrous cycles since calving based on elevated serum progesterone concentrations during 10 days prior to the Cosynch + CIDR protocol. [4]Kansas State University Purebred Beef Unit, Manhattan. [5]Agriculture Research Center, Hays.

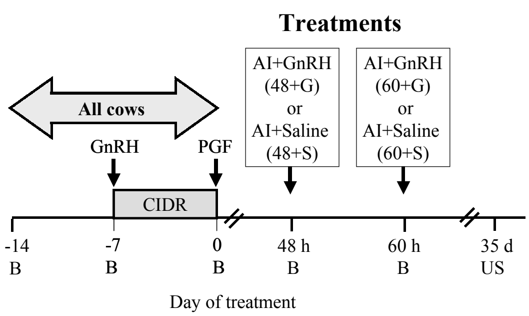

Figure 1. Experimental Protocols: B = Blood Sample, US = Ultrasound Pregnancy Diagnosis.

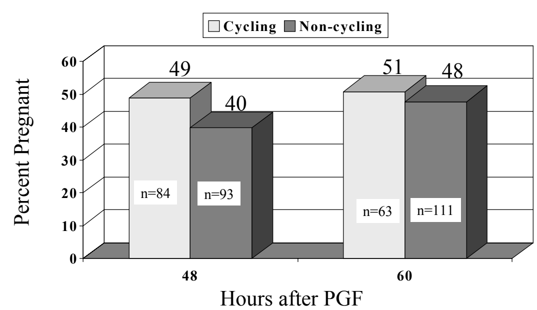

Figure 2. Effect of Time of Insemination on Pregnancy Rates.

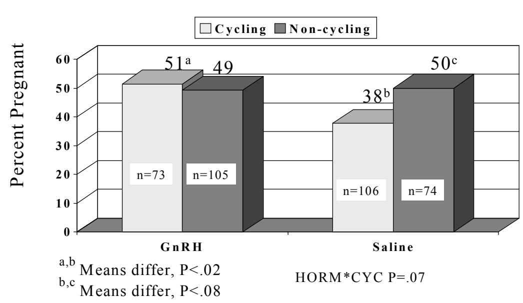

Figure 3. Effect of GnRH or Saline at Timed AI on Pregnancy Rates.