Kansas Agricultural Experiment Station Research Reports

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

Article 549

1997

Fertility after timed breeding using GnRH, PGF2, and norgestomet

K. E. Thompson

G.C. Lamb

T.J. Marple

See next page for additional authors

Fertility after timed breeding using GnRH, PGF2, and norgestomet

Abstract

At the KSU Purebred Unit, 164 purebred Angus, Hereford, and Simmental cows were used to test a new estrus-synchronization program using GnRH, PGF2, and norgestomet. Cows were inseminated after detected estrus, or in the absence of estrus, inseminations were made at one fixed time after a second injection of GnRH. The treatment consisted of a 100 µg injection of GnRH plus a 6-mg ear implant of norgestomet. Seven days later, the ear implant was removed, and 25-mg of PG F2% was injected. In the absence of estrus, the time-bred group received a second injection of GnRH 48 h after PGF2% and was inseminated 16 h later. The treatment induced 10 of 36 anestrous cows to ovulate. Conception rates tended (P<.09) to be greater in Angus (72.2%) than Hereford cows (52.8%) , with conception rates in Simmental cows (51.5%) being similar to those in Hereford. Overall, pregnancy rates were similar between the time-bred group (59.3%) and the estrus-bred group (53.8%). We conclude that using GnRH, PG F2%, and norgestomet in a timed breeding program ca n eliminate the necessity of heat detection. In addition, the treatment induced estrus in 28% of the noncycling cows.

Keywords

Cattlemen's Day, 1997; Kansas Agricultural Experiment Station contribution; no. 97-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 783; Beef; GnRH; PGF2; Norgestomet; Timed breeding; Anestrous suckled cows; Induced ovulation

Authors

K. E. Thompson, G.C. Lamb, T.J. Marple, L.R. Corah, R.M. McKee, Jeffrey S. Stevenson, David M. Grieger, and David A. Nichols

FERTILITY AFTER TIMED BREEDING USING GnRH, PG$F_{2\alpha}$, AND NORGESTOMET [1]

K. E. Thompson, J. S. Stevenson, D. M. Grieger, G. C. Lamb, T. J. Marple, L. R. Corah, D. A. Nichols, and R. M. McKee

Summary

At the KSU Purebred Unit, 164 purebred Angus, Hereford, and Simmental cows were used to test a new estrus-synchronization program using GnRH, PG$F_{2\alpha}$, and norgestomet. Cows were inseminated after detected estrus, or in the absence of estrus, inseminations were made at one fixed time after a second injection of GnRH. The treatment consisted of a 100 μg injection of GnRH plus a 6-mg ear implant of norgestomet. Seven days later, the ear implant was removed, and 25-mg of PG$F_{2\alpha}$ was injected. In the absence of estrus, the time-bred group received a second injection of GnRH 48 h after PG$F_{2\alpha}$ and was inseminated 16 h later. The treatment induced 10 of 36 anestrous cows to ovulate. Conception rates tended (P<.09) to be greater in Angus (72.2%) than Hereford cows (52.8%), with conception rates in Simmental cows (51.5%) being similar to those in Hereford. Overall, pregnancy rates were similar between the time-bred group (59.3%) and the estrus-bred group (53.8%). We conclude that using GnRH, PG$F_{2\alpha}$, and norgestomet in a timed breeding program can eliminate the necessity of heat detection. In addition, the treatment induced estrus in 28% of the noncycling cows.

(Key Words: GnRH, PG$F_{2\alpha}$, Norgestomet, Timed Breeding, Anestrous Suckled Cows, Induced Ovulation.)

Introduction

The goals of estrus-synchronization programs are to shorten the breeding season, produce a more uniform calf crop, and allow the production of more calves from artificial insemination (AI) sires with superior genetic potential for growth and carcass traits. Limitations of AI in the beef industry are the additional cost and expertise associated with AI breeding and the poor response of late-calving (anestrus) cows to current estrus-synchronization programs when applied at the onset of the breeding season. In attempt to resolve these problems, we tested a new estrus-synchronization program using GnRH, PG$F_{2\alpha}$, and norgestomet. An advantage of this program is its ability to induce estrus in anestrous suckled cows without increasing the incidences of persistent follicles and short cycles that typically occur after breeding at the first postcalving estrus.

Experimental Procedures

Fifty two primiparous and 112 multiparous purebred Angus, Hereford, and Simmental cows located at the KSU Purebred Unit were assigned randomly to two groups. All cows received a 100-μg injection of GnRH (Cystorelin®) and a 6-mg norgestomet ear implant (SyncroMate® implant only) 7 days before an injection of PG$F_{2\alpha}$ and implant removal on day 0 (Figure 1). Cows assigned to the estrus-bred group were inseminated 12 to 16 hr after detected estrus. Cows assigned to the estrus + time bred

[1]Partial funding of this study was provided by Select Sires, Plain City, OH.

group were inseminated after detected estrus until 48 hr after PGF $_{2\infty}$; noninseminated cows then were given a second l00- µg GnRH injection and inseminated 16 hr later. Three blood samples were collected: 11 days before GnRH (day -18), on the day when GnRH was given (day -7), and just before the injection of PGF $_{2\infty}$ (day 0). Concentration of progesterone in the first two blood samples were used to determine the cycling status of cows, and the third was used to determine the number of cows induced to ovulate after the first GnRH injection. Between days 33 and 43 after AI, pregnancy was detected using transrectal ultrasonography.

Results and Discussion

At the beginning of the breeding season, 83.3% of Angus, 68.4% of Hereford, and 75% of Simmental cows were cycling. Of the 36 animals not cycling, 10 were induced to ovulate after the first GnRH injection. Because the primiparous cows calved 22 to 31 days before the multiparous cows, the percentage cycling was similar between the younger and older cows. Body conditions at the beginning of the breeding season were similar among treatment, breed, and parity groups, and averaged 5 on a scale of 1 to 9 (Table 1).

Conception rate tended (P = .09) to be greater in Angus (72.2%) than Hereford (52.8%) cows. Conception rate in Simmental cows (51.5%) was similar to the Hereford cows, but less than that for the Angus cows. Conception rate (the proportion of cows detected in estrus and inseminated during the first 144 hours after the injection of PGF $_{2\infty}$ that become pregnant) was greater (P = .06) for the estrus-bred group (67.7%) than in the estrus + time bred group (59.3%) (Table 2). In contrast, pregnancy rates (the proportion of cows assigned to treatment that became pregnant) were similar between treatments. Therefore, use of timed breeding allowed us to impregnate cows that might have been missed when breeding was based solely on heat detection.

Combining heat detection and timed breeding after GnRH, PGF $_{2\infty}$, and norgestomet can eliminate the extra labor devoted to heat detection before first inseminations .Our results with this method of heat synchronization indicate no difference between breeding after detected estrus or combining estrus detection with timed AI. This treatment protocol induced ovulation in suckled anestrous cows. By synchronizing ovulation prior to timed breeding, the number of pregnant cows can be increased by eliminating the possibilities of missed heats or silent heats.

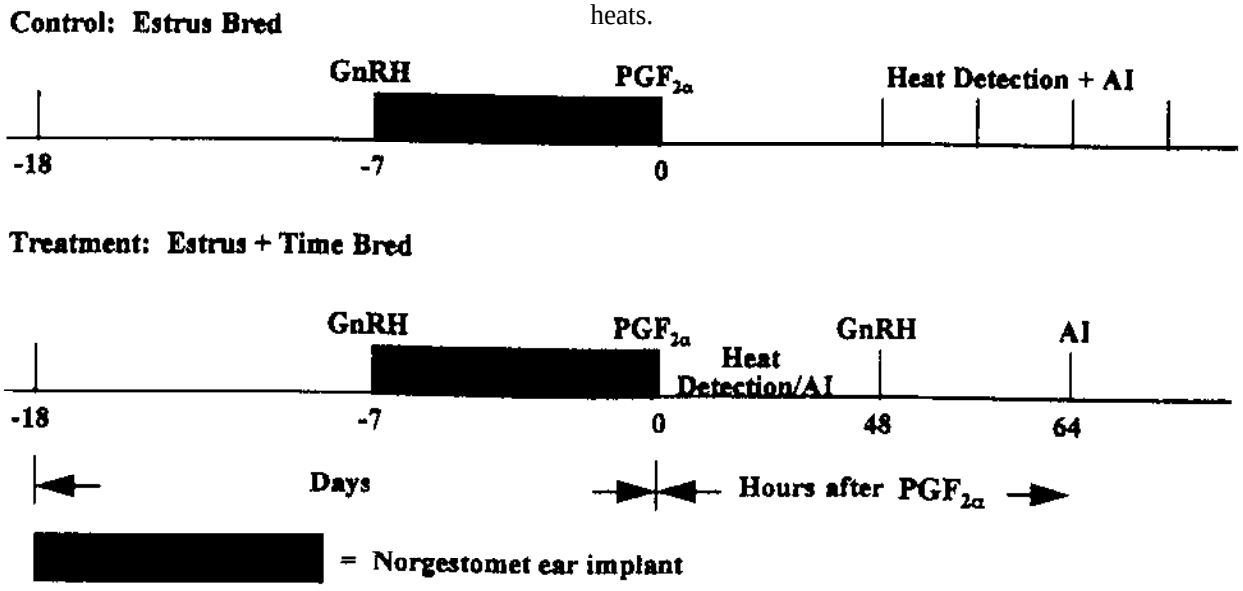

Figure 1. Experimental Protocol for Estrus Synchronization Using GnRH, PGF $_{2\infty}$, and Norgestomet.

Table 1. Percentage of Cows Cycling, Body Condition, and Days Postpartum at Onset of Treatments in Angus, Hereford, and Simmental Cattle

Breed	No.	% Cycling [a]	Body condition	Days Postpartum
Angus				
Primiparous	25	84.0	4.9	91
Multiparous	65	83.1	4.7	69
Hereford				
Primiparous	13	76.9	4.9	88
Multiparous	25	64.0	5.0	64
Simmental				
Primiparous	14	85.7	5.0	90
Multiparous	22	68.2	5.0	59

[a]Percentage of cows with elevated serum progesterone before the beginning of the breeding season.

Table 2. Effect of using GnRH, PGF $_{2\alpha}$, and Norgestomet on Estrus, Conception Rate, and Pregnancy Rate

		Heat Detection + Time Bred		
Item	Estrus Bred	Estrus Bred	Time Bred	Total
% in Heat	79.5 (78) [c]	100 (16)	14.3 (70)	30.2 (86)
% Conception [a]	67.7 (62)	68.8 (16)	57.1 (70)	59.3[x] (86)
% Pregnant [b]	53.8 (78)	68.8 (16)	57.1 (70)	59.3 (86)

[a]% Conception = no. of pregnant cows/no. of cows inseminated during 144 hours after PG $F_{2\alpha}$.
[b]% Pregnant = no. of pregnant cows/no. of cows synchronized.
[c]Number of cows.
[x]Different (P=.06) from estrus bred.