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Site of semen deposition and fertility in lactating beef cows synchronized with GnRH and PGF 2α

Abstract

Our objective was to determine the effect of site of semen deposition on pregnancy rate in beef cows inseminated at a fixed time or after observed estrus. Cows were synchronized with a combination of gonadotropin-releasing hormone (GnRH) prostaglandin-F α (PGF). GnRH was injected 7 days before PGF (day 0; first of breeding season). The trial was conducted at two locations, one in Kansas (147 cows) and one in Colorado (313 cows). At each location, cows were assigned to be inseminated after observed estrus (ESTRUS-AI) or at a fixed time (TIMED-AI). Within these two groups, cows either were inseminated in the uterine body (BODY-bred) or in both uterine horns (HORN-bred). Cows in the ESTRUS-AI group were observed for estrus each morning and evening until day 5 after PGF and then inseminated 12 hr after first detected estrus. Cows in the TIMED-AI group received a second dose of GnRH on day 2 and were inseminated at that time (48 to 56 hr after PGF). Heat response, AI conception rate, and pregnancy rate were analyzed for BODY-bred and HORN-bred cows within each treatment at each location. No differences in these variables occurred between locations, so the results were combined. Within the ESTRUS-AI group, neither conception rate (70% vs. 73%) nor pregnancy rate (39% vs. 40%) was different between BODY-bred and HORN-bred cows respectively. Pregnancy rate within the TIMED-AI group tended ($P=.09$) to be greater for BODY-bred (53%) compared to HORN-bred (42%) cows. When BODY-bred and HORN-bred treatments were combined, the pregnancy rate of TIMED-AI cows (48%) tended ($P=.07$) to be greater than that of ESTRUS-AI cows (39%). Timed-insemination resulted in a greater pregnancy rate than inseminating cows according to estrus. No advantage was seen in conception rates when semen was deposited in the uterine horns compared to the uterine body.

Keywords

Kansas Agricultural Experiment Station contribution; no. 97-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 804; Cattlemen's Day, 1998; Beef; AI; Timed insemination; Horn breeding; Estrous synchronization; Cows

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**SITE OF SEMEN DEPOSITION AND FERTILITY
IN LACTATING BEEF COWS SYNCHRONIZED
WITH GnRH AND PGF_{2α}¹**

*D. M. Grieger, G. C. Lamb, T. G. Rozell,
K. E. Thompson, J. S. Stevenson, and K. Anderson²*

Summary

Our objective was to determine the effect of site of semen deposition on pregnancy rate in beef cows inseminated at a fixed time or after observed estrus. Cows were synchronized with a combination of gonadotropin-releasing hormone (GnRH) and prostaglandin-F₂ alpha (PGF). GnRH was injected 7 days before PGF (day 0; first day of breeding season). The trial was conducted at two locations, one in Kansas (147 cows) and one in Colorado (313 cows). At each location, cows were assigned to be inseminated after observed estrus (ESTRUS-AI) or at a fixed time (TIMED-AI). Within these two groups, cows either were inseminated in the uterine body (BODY-bred) or in both uterine horns (HORN-bred). Cows in the ESTRUS-AI group were observed for estrus each morning and evening until day 5 after PGF and then inseminated 12 hr after first detected estrus. Cows in the TIMED-AI group received a second dose of GnRH on day 2 and were inseminated at that time (48 to 56 hr after PGF). Heat response, AI conception rate, and pregnancy rate were analyzed for BODY-bred and HORN-bred cows within each treatment at each location. No differences in these variables occurred between locations, so the results were combined. Within the ESTRUS-AI group, neither conception rate (70% vs. 73%) nor

pregnancy rate (39% vs. 40%) was different between BODY-bred and HORN-bred cows, respectively. Pregnancy rate within the TIMED-AI group tended (P=.09) to be greater for BODY-bred (53%) compared to HORN-bred (42%) cows. When BODY-bred and HORN-bred treatments were combined, the pregnancy rate of TIMED-AI cows (48%) tended (P=.07) to be greater than that of ESTRUS-AI cows (39%). Timed-insemination resulted in a greater pregnancy rate than inseminating cows according to estrus. No advantage was seen in conception rates when semen was deposited in the uterine horns compared to the uterine body.

(Key Words: AI, Timed Insemination, Horn Breeding, Estrous Synchronization, Cows.)

Introduction

The optimal site of semen deposition for artificial insemination (AI) of cattle is the body of the uterus. However, with the recent advances in breeding at a fixed time after synchronization with GnRH and prostaglandin (PGF), we questioned whether the deposition of semen into each uterine horn might improve conception. Therefore, our objective was to determine if the site of semen deposition would affect pregnancy rates in beef cows time-bred after being synchronized with a GnRH-PGF system

¹Sincere appreciation is expressed to Rezak Land & Livestock Co., Onaga, Kansas and Lindner Ranches, Durango, Colorado.

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Experimental Procedures

The experiment was conducted in postpartum lactating beef cows on a ranch in Kansas (n=147) and a ranch in Colorado (n=313). At each location, cows were assigned to be inseminated after observed estrus (ESTRUS-AI) or at fixed time (TIMED-AI). The experimental design is shown in Figure 1. Cows in the ESTRUS-AI group were given 100 µg of GnRH (Fertagyl[®]) at day -7. On day 0 (first day of the breeding season), these cows were given 25 mg of PGF (Lutalyse[®]) and then observed for estrus each morning and evening until day 5. Cows observed in estrus were inseminated 12 hr later. Cows in the TIMED-AI group also were given GnRH at day -7 and PGF at day 0 but then received a second dose of GnRH on day 2 and were inseminated at that time (48 to 56 hr after PGF). All cows in the TIMED-AI group were inseminated, whereas only cows showing estrus were inseminated in the ESTRUS-AI group. At AI, semen was placed in the uterine body (BODY-bred) or in both uterine horns (HORN-bred). In BODY-bred cows, the entire contents of the straw were deposited in the uterine body just past the internal os of the cervix. In HORN-bred cows, one half of the semen was deposited 2 to 3 inches deep into one uterine horn. The AI gun then was pulled back and inserted 2 to 3 inches deep into the opposite horn, where the remaining semen was deposited. All inseminations at each ranch were divided equally between two technicians. Heat response, AI conception rate, and pregnancy rate were analyzed for BODY-bred and HORN-bred cows within each treatment at each location. Conception rates were determined by intrarectal ultrasonography at 30 to 50 days postbreeding.

Results and Discussion

At the Kansas location, 39 of 74 cows (53%) in the ESTRUS-AI group were observed in estrus and inseminated and 28 conceived (72%), resulting in a pregnancy rate of 38% (28 of 74). This did not differ from the pregnancy rate of 44% (32 of 73 cows) obtained in the TIMED-AI group at the Kansas ranch.

At the Colorado location, 91 of 163 cows (56%) in the ESTRUS-AI group were observed in estrus and inseminated and 65 conceived (71%), resulting in a 40% pregnancy rate. This was not statistically different than the 49% (74 of 150) pregnancy rate of cows in the TIMED-AI group at this location.

Because no statistical differences occurred between locations in heat response, conception rate, or pregnancy rate, these data were combined (Table 1). Within the ESTRUS-AI cows, no differences in conception rate (70% vs. 73%) or pregnancy rate (39% vs. 40%) were detected, whether BODY-bred or HORN-bred. In the TIMED-AI group, the pregnancy rate tended ($P=.09$) to be higher for BODY-bred cows (53%) than for HORN-bred cows (42%). Therefore, horn breeding in this study did not increase fertility and may have been detrimental. When the results for HORN-bred and BODY-bred cows were combined, the pregnancy rate tended ($P=.07$) to be greater for TIMED-AI cows (48%) than for ESTRUS-AI cows (39%).

To summarize, these results indicate no clear advantage to horn-breeding cows, whether inseminated at a fixed time or afterdetected estrus. These results indicate a potential increase in pregnancy rate with fixed-timed AI after a GnRH-PGF-GnRH estrus-synchronization program, compared to

breeding only cows that show estrus. Individual ranches must consider the advantages (no heat detection, increased AI preg-

nancy rate) and disadvantages (increased semen and hormone costs) before using timed AI in conjunction with this estrus-synchronization program.

Table 1. Heat Response, Conception Rate, and Pregnancy Rate of Cows Bred According to Estrus (ESTRUS-AI) or at One Fixed Time (TIMED-AI) with Semen Deposited in the Uterine Body (BODY) or in Both Uterine Horns (HORN)

Item	ESTRUS-AI		TIMED-AI	
	BODY	HORN	BODY	HORN
No. of cows	119	118	115	108
% in estrus	55%	54%	---	---
No. conceived to AI, %	46/66 (70%)	47/64 (73%)	61	45
No. pregnant, %	46/119 (39%)	47/118 (40%)	61/115 (53%) ^a	45/108 (42%)
Overall pregnancy rate	93/237 (39%) ^b		106/223 (48%)	

^aTended (P=.09) to differ from HORN-bred TIMED-AI cows.

^bTended (P=.07) to differ from TIMED-AI cows.

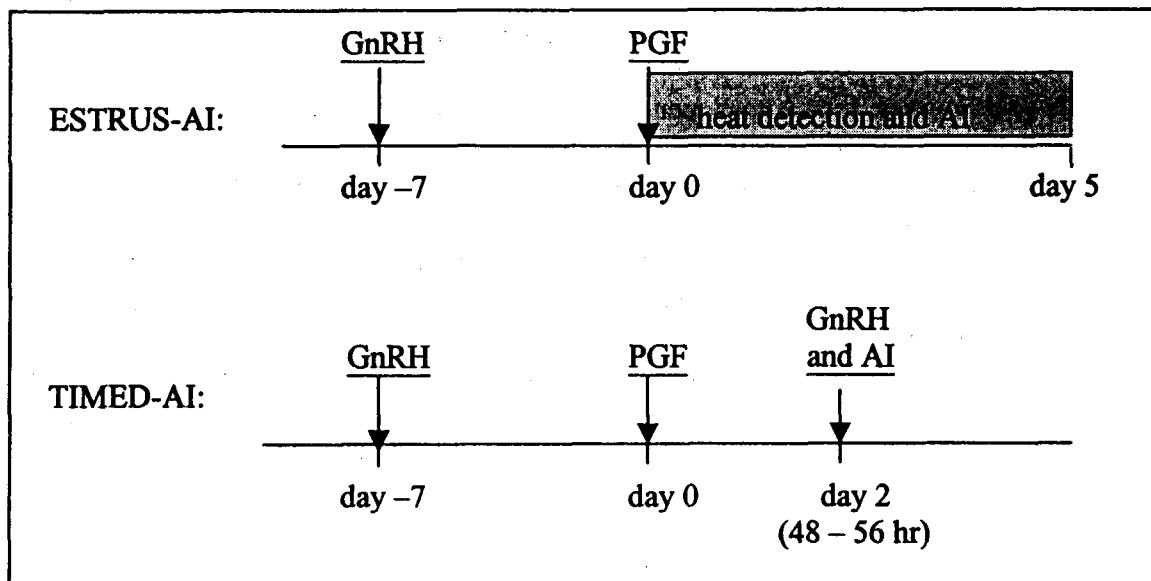


Figure 1. Experimental Design.