USE OF GNRH TO INCREASE THE PRECISION OF ESTRUS AND AUGMENT TIMED INSEMINATION IN HEIFERS TREATED WITH MELENGESTEROL ACETATE AND $PGF_{2\alpha}$[1]

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Summary

We examined the potential of adding gonadotropin-releasing hormone (GnRH) to a synchrony system based on melengestrol acetate-prostaglandin $F_{2\alpha}$ (MGA-$PGF_{2\alpha}$) to increase the precision of synchronized estrus and augment timed artificial insemination (AI). Yearling heifers were fed MGA daily for 14 days. Nineteen days after the last feeding of MGA, all heifers were given $PGF_{2\alpha}$ (day 0). Heifers receiving no further treatment served as the untreated controls. In the second treatment, heifers also received an injection of GnRH on day –7. Both groups of heifers were artificially inseminated 12 hours after detected estrus. Heifers in the third treatment received GnRH on day –7 and day 2 and were inseminated (timed AI) at the time of the second GnRH injection. In comparison to a MGA-$PGF_{2\alpha}$ synchronization system, addition of GnRH on day –7 did not improve the synchrony of estrus. Adding two injections of GnRH (day –7 and day 2) facilitated timed AI. However, pregnancy rate for timed AI was lower than pregnancy rate for AI 12 hours after detection of estrus.

(Key Words: AI, Estrus Synchronization, Timed AI, GnRH, MGA, Heifers.)

Introduction

The MGA-$PGF_{2\alpha}$ synchronization system has been highly effective for facilitating the use of AI in heifers. Increasing the interval from the last feeding of MGA to the injection of $PGF_{2\alpha}$ from 17 days to 19 days seems to improve the synchrony of estrus (1998 Cattlemen's Day, pg. 31). Various permutations of timed AI and double insemination have been tried with the MGA-$PGF_{2\alpha}$ system. However, without controlling the timing of ovulation, results are variable. University of Missouri researchers found that an injection of GnRH prior to $PGF_{2\alpha}$ in a MGA- $PGF_{2\alpha}$ system, concentrated estrus during the synchrony period. The hypothesis for this study was that an injection of GnRH 1 week before $PGF_{2\alpha}$ in the MGA-$PGF_{2\alpha}$ system might synchronize follicle growth sufficiently to allow for timed AI.

Experimental Procedures

Yearling heifers from four herds (n=709) were used in the study. Herd A included 439 head of black and black baldy heifers; Herd B, 100 head of Angus cross, Angus×South Devon, and Angus× Limousin heifers; Herd C, 83 head of Angus and Angus × Simmental heifers; and Herd D, 87 head of Angus and Angus × Simmental heifers. All heifers were fed MGA (.5mg/head) daily for 14 days (days –32 to day –19 of the experiment). Nineteen days after the last feeding of MGA, all heifers were given 25 mg of $PGF_{2\alpha}$ (Lutalyse®; day 0). Heifers receiving no further treatment served as the untreated controls (control, n=253) and were inseminated artificially 12 hours after detection of estrus. In the second treatment, heifers

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received an injection of GnRH (Cystorelin®;100mg) on day –7 (GnRH, n=260) and were inseminated artificially 12 hours after detected estrus. Heifers in the third treatment received GnRH on day –7 and day 2 (2xGnRH, n=196) and were inseminated at the time of the second GnRH injection (timed AI). Heifers in the 2xGnRH treatment that were detected in estrus early (before day 1.5) were bred 12 hours after detection. For purposes of data summary, we defined the synchrony period as days 0 to 7 after $PGF_{2\alpha}$.

The length of the total AI period varied with location. Heifers were exposed to bulls after AI for a total breeding season of approximately 60 days. Pregnancy diagnosis (ultrasound) occurred between 35 and 70 days after $PGF_{2\alpha}$. At all locations, heifers not diagnosed as pregnant at the first ultrasound, were re-evaluated 30 days or more after bulls were removed.

Results and Discussion

The onsets of estrus for heifers in the control and GnRH treatments for Herds A and B are shown in Figure 1. For both groups, the most heifers were detected in heat between 49 and 60 hours after $PGF_{2\alpha}$. Proportion of heifers exhibiting estrus from days 0 to 7 after $PGF_{2\alpha}$ (83.4 and 86.5%) and the average day of insemination during the synchrony period (days 3.0 ±.09 and 2.8 ±.08) did not differ between the control and GnRH treatments, respectively. In the 2xGnRH group, 18 of 196 (9.2%) heifers were detected in heat before day 1.5 and were bred 12 hours after detection of estrus. Timed insemination was performed on the remaining 178 heifers. Conception rate for this group was 72.2% (13/18). In Herds A, C, and D, heifers in the 2xGnRH group were observed for estrus after the timed AI. In Herd A, 23/107 (21.5%) heifers exhibited heat after the timed breeding between days 5-8. These heifers were bred 12 hours after detection of estrus, but the assumption was made that they did not conceive to the timed AI. Conception rate for 2xGnRH heifers that were bred between days 5 and 8 was 91.3%. In Herds C and D, no heifers were observed in heat during this time period.

Conception rates during the synchrony period for control (160/211; 75.8%) and GnRH (160/225; 71.1%) treatments did not differ and were greater ($P<.05$) than the conception rate following timed AI in the 2xGnRH treatment (83/178; 46.6%). Similarly, pregnancy rate during the synchrony period did not differ for the control and GnRH treatments (63.2 and 61.5%, respectively) but was greater ($P < .05$) than the pregnancy rate in the 2xGnRH treatment when only pregnancies resulting from timed AI were considered (83/196; 42.3%). If pregnancies in the 2xGnRH group that resulted from AI 12 hours after estrus, either before (13/18) the timed AI period or to a second AI after timed AI (21/23), are included, the pregnancy rate during the synchrony period in this treatment was 59.7%. Thus, a combination of timed AI and some heat detection resulted in a pregnancy rate not different from that of the control and GnRH treatments. Although some time was still spent on heat detection in this case, time spent sorting and resulting stress on the heifers were reduced. This time savings would be most relevant to producers synchronizing large groups of heifers and must be weighed against the cost of GnRH. Pregnancy rates for the entire breeding season did not differ among treatments.

Table 1. Pregnancy Rate during the Synchrony Period and Breeding Season

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	Treatment		
Variable	Control	GnRH	2xGnRH
No. of heifers	253	260	196
Pregnancy rate (%)			
Days 0 - 7	63.2 [a]	61.5 [a]	42.3 [b*]
Breeding season	92.1	90.8	89.3

[a,b]Means with different superscripts differ (P<.05).
*Timed AI only.

Figure 1. Onset of Estrus for Heifers in Control and GnRH Treatments, Herds A and B combined.