1988

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EFFECTS OF BULL EXPOSURE AND GONADOTROPIN RELEASING HORMONE ON POSTPARTUM INTERVAL AND FERTILITY IN BEEF COWS

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CATTLE 88-15

Summary

Spring calving beef cows were utilized in a study to determine the effects of bull exposure (BE) and Gonadotropin Releasing Hormone (GnRH) administration on return to estrus and reproductive efficiency. Cows were either exposed to an epididectomized bull soon after calving until the breeding season or not exposed to bulls (NE). All cows were synchronized with Synchro-Mate B (SMB). One-half of the BE and NE cows were implanted with GnRH at SMB implant removal in 1987 or given an injection of GnRH at breeding in 1988. Each year, 20 cows were bled hourly for 80 consecutive hours after SMB removal. There was no difference (P>.05) in days from calving to first estrus, calving date, number of cows cycling before breeding or conception rate to the synchronized estrus between BE or NE cow groups. In 1987 GnRH implants reduced (P<.05) the time from SMB removal to the pre-ovulatory LH peak by 23.5 hours. However, there was no difference (P>.05) in LH peak levels, duration of Luteinizing Hormone (LH) peak or conception rate. Bull exposure and GnRH implants had little effect on the interval from calving to first estrus or reproductive performance.

(Key Words: Cows, Bull Exposure, GnRH, Postpartum Interval, Fertility.)

Introduction

The postpartum interval is the period of time from calving until the first estrus that is accompanied by ovulation. Management practices to decrease the time from calving to first fertile estrus would be economically beneficial to the cow-calf producer. Decreasing postpartum interval should allow more time from first fertile estrus until the breeding season. This would increase the probability of cows conceiving early in the breeding season, resulting in older and heavier calves at weaning and assuring cows maintain a 365-day calving interval.

Recent research at SDSU and other research stations have indicated the presence of bulls immediately after calving may reduce the time to first estrus in beef cows.

Gonadotropin Releasing Hormone (GnRH) administered before breeding has resulted in various results concerning conception rate. Since GnRH controls the release of Luteinizing Hormone (LH) which causes ovulation, administration of GnRH may result in increased fertility.

The purpose of this study is to evaluate the effects of bull exposure postpartum on resumption of estrus and subsequent fertility and the effects of GnRH administration on fertility in the beef cow.

Materials and Methods

Forty-six beef cows in 1987 and 59 in 1988 were allotted to one of two treatment groups. Each year after calving (1 to 7 days) every other cow was exposed to a sterile bull (BE). The remainder were not subjected to bull exposure (NE). Cow groups were maintained in separate pastures with no fence-line contact. Supplementary feeding consisted of corn silage and haylage or hay to meet nutrient requirements and trace mineral salt. Cows were in excellent body condition throughout the experimental period.

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Cows in both groups were bled weekly via jugular venipuncture from 30 days after calving until synchronization to determine when cycling occurred. Serum progesterone values were determined by radioimmunoassay to confirm cycling status.

All cows were synchronized with Synchro-Mate B (SMB). Following SMB implant removal, calves were separated from the cows for 48 hours. Cows were artificially inseminated 48 hours after implant removal. In 1987 one-half of the cows were given a GnRH implant at the time of SMB removal. In 1988 GnRH implants were not available, so a GnRH injection was given to one-half the cows at the time of AI. During the next 30 days a sterile bull was utilized for estrus detection and cows returning to estrus were inseminated. Cows were then exposed to an intact bull for an additional 30 days.

Each year 20 cows (10 from BE and 10 from NE; one-half receiving GnRH and one-half not receiving GnRH) were cannulated and bled hourly after implant removal for 80 hours. Blood samples were assayed in 1987 for LH and are presently being assayed for 1987 estradiol and 1988 LH and estradiol levels.

Results and Discussion

There was a trend for cows exposed to bulls to return to estrus sooner than those not exposed (Table 1) but this was not a significant advantage (P>.05). Cows in the BE group had a 5-day advantage in 1987 and 4 days in 1988. There was no difference (P>.05) in calving date either of the 2 years.

No difference (P>.05) was detected in the number of cows in estrus before synchronization between the BE and NE groups. However, there was a difference (P<.05) between the 2 years in the percentage of cows in estrus before synchronization. In 1987 the number of cows in estrus before synchronization was less than expected (39.1 and 30.4% for BE and NE, respectively). No apparent reason for the significant year difference is suggested with average calving date similar both years. Synchronized estrus conception rate was lower in 1987 than 1988 but not significantly. This may be associated with the GnRH implant used in 1987 compared to the injection in 1988. Conception rate for BE and NE cows was similar (P>.05) during the AI period and breeding period in 1987. Conception rate for the AI and breeding season for 1988 will be determined using calving dates in 1989.

TABLE 1. AVERAGE CALVING DATE, DAYS FROM CALVING TO FIRST ESTRUS, COWS IN ESTRUS AND CONCEPTION RATES FOR BE AND NE COWS

	1987		1988	
	Bull exposed	Nonexposed	Bull exposed	Nonexposed
No. cows	23	23	30	29
Avg calving date	3-20	3-19	3-21	3-23
Days from calving to 1st estrus	50.7±4.8	55.9±4.1	46.8±3.2	50.8±3.6
No. cows in estrus prior to synchronization	9[a]	7[a]	20[b]	19[b]
Conception[c] to:				
synchronized estrus, %	30.4	47.8	46.7	48.3
AI period, %	73.9	87.0		
breeding season, %	91.3	95.6		

[a,b] Values in rows with unlike superscripts differ (P<.05).
[c] 1987 based on calving, 1988 based on breeding records.

There was a difference (P<.05) in the timing of the pre-ovulatory LH peak in cows implanted with GnRH (Table 2). The peak in implanted cows occurred 23.4 hours earlier than in nonimplanted cows. There was no difference in LH peak levels, length of the LH surge or LH levels during the sampling period between GnRH implanted and nonimplanted cows. The synchronized estrus conception rate was not different (P>.05) between the two groups or between years. Implanted cows in 1987 had lower conception rate (though not significant) than nonimplanted cows. This is probably due to the earlier occurrence of the pre-ovulatory surge, resulting in the

implanted cows ovulating sooner. Since all cows were inseminated at the same time, the earlier ovulating GnRH implanted cows may have had aged ova resulting in lower conception rates. There was an advantage in conception rate to synchronized AI in 1988 for cows injected with GnRH compared to noninjected cows (60.7 vs 39.3%, respectively).

TABLE 2. PEAK LH LEVELS, DURATION OF LH PEAK, TIME OF PEAK LH OCCURRENCE AND CONCEPTION RATE TO COWS IMPLANTED OR INJECTED WITH GNRH

	1987		1988	
	GnRH	Control	GnRH	Control
No. cows	24	22	28	28
Hours from SMB removal to LH peak	19.4[a]	42.9[b]		
LH peak levels, mg/ml	23.5	22.4		
LH peak duration, hours	12.3	10.2		
Conception rate to synchronized estrus[c], %	33.3	45.5	60.7	39.3

[a,b] Values in rows with unlike superscripts differ($P<.05$).
[c] Cows implanted with GnRH in 1987 and injected in 1988.

This study will continue for an additional year injecting cows with GnRH at breeding. Hormone data will be determined to provide information on circulating levels in cows administered GnRH at breeding to increase conception rate.