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Bull Exposure, When Combined With a Seven-day MGA Synchronization, Does Not Enhance Conception Rates in Cows

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Summary

The purpose of the current experiments was to determine if cows exposed to sterile bulls (epididyectomized) in combination with a 7-day MGA treatment would have an advantage in conception rates to cows not exposed to bulls. Bull exposure increased percentage of cows cycling prior to synchronization and reduced the time from calving to initiation of cycling. Overall there was not an increase in conception rates to timed TAI or in total pregnancy rates in bull exposed MGA treated cows when compared to cows not exposed to bulls.

Introduction

Shortening the postpartum interval for beef cows has been a difficult task for cattle producers. Although the scientific explanation is not clear, researchers have demonstrated bull exposure may reduce the postpartum anestrous interval. Cows that have been exposed to bulls early in the postpartum period resumed cyclicity sooner than nonexposed cows. Synthetic progestins, such as MGA, also have been used to induce cyclic activity in heifers and mature cows and to synchronize estrous cycles. Therefore, the objectives of this experiment were to determine if bull exposure and a 7-day MGA feeding period would increase conception rates, compared to cows administered MGA without bull exposure.

Procedure

The objectives of the following experiments were to determine the effects of bull exposure and/or 7-day MGA treatment on the following variables 1) percentage cycling at the beginning of the trial (first blood sample taken approximately 60 days before breeding); 2) percentage cycling at the time of synchronization; 3) calving to initiation of cyclic activity; 4) percentage conceived to TAI; and 5) final pregnancy rate.

In a 2002 trial, cows were exposed (n= 88) or not exposed (n= 97) to surgically sterilized bulls (epididyectomized) at least 30 days prior to breeding at a bull to cow ratio of 1:20 (Figure 1). Blood samples were taken at four different time points before the synchronization protocol was initiated. Progesterone assays were analyzed and a female was considered cycling if serum progesterone concentration was at least 1 ng/ml or greater at blood collection. The females were given a $PGF_{2\alpha}$ injection (5 mg/cow) before starting on a 7-day treatment of MGA (.5 mg/kg/day). After the MGA feeding period, the cows were again injected with prostaglandin (5 mg/cow). The females were artificially inseminated 70 hours after the second prostaglandin injection (Figure 1). Fertile bulls were placed with cows two weeks after TAI.

In a second trial, which was conducted over two years (2003-2004), a similar procedure was followed. Cows were allotted to bull exposed (n= 170) or non-bull exposed (n=176) groups and bled at regular intervals to determine cyclicity. Cows in the bull exposure group were exposed to sterile bull (epididyectomized but has libido) for at least 30 days prior to breeding at a bull to cow ratio of 1:20 (Figure 2). In this trial, cows were given an injection of GnRH (0.1 mg) before a 7-day MGA treatment. On the last day of MGA treatment, the cows were given an injection of $PGF_{2\alpha}$ and artificially inseminated 55 to 60 hours after the $PGF_{2\alpha}$ injection (Figure 2). Fertile bulls were placed with cows two weeks after TAI. All data were analyzed using SAS. Effects of treatment were determined with a one-way ANOVA and treatment means were analyzed using a Dunnett's test. Percentage of cows

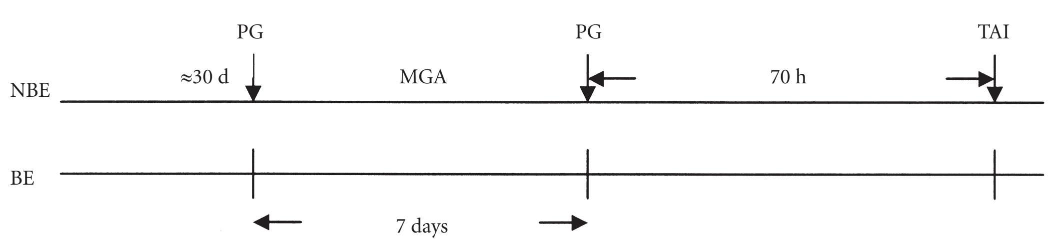

Figure 1. Experimental protocol for Trial 1.

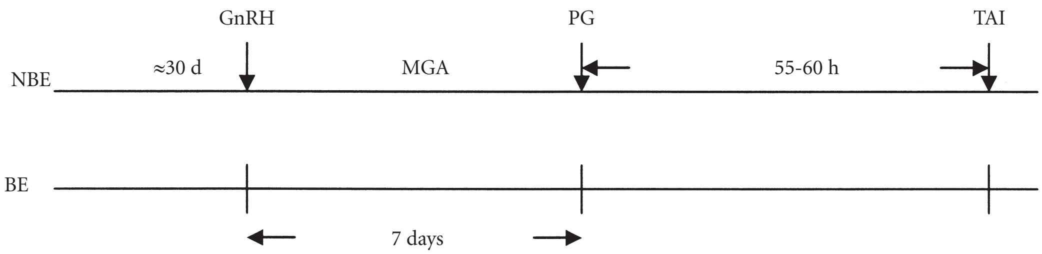

Figure 2. Experimental protocol for Trial 2.

Table 1. Results of Trial 1 conducted in 2002.

	AGE					
	First calf cows		2nd calf cows (2-3 yr of age)		Mature cows (> 3 yr of age)	
Treatment	NBE[a]	BE	NBE	BE	NBE	BE
n	26	24	21	20	50	44
Cycling at beginning of trial, %	19.2[b]	33.3[b]	19.1[b]	50.0[c]	18.0[b]	9.3[b]
Cycling after bull exposure, %	65.4[b]	75.0[b]	61.6[b]	95.0[c]	78.0[b]	95.4[c]
Calving (or birth) to start of cycling, days	412[b]	407[b]	85[b]	71[c]	50[b]	43[b]
Conceived to TAI, %	42.3[b]	50.0[b]	14.3[b]	20.0[b]	18.0[b]	16.3[b]
Final pregnancy rate, %	80.8[b]	75.0[b]	85.7[b]	95.0[b]	84.0[b]	90.7[b]

[a]NBE = No bull exposure; BE = Bull exposure.
[b,c]Different letters between columns within age depict significant differences, ($P < 0.05$).

Table 2. Results of Trial 2 conducted in 2003.

	AGE					
	First calf cows, age		2nd calf cows (2-3 yr of age)		Mature cows (> 3 yr of age)	
Treatment	NBE[a]	BE	NBE	BE	NBE	BE
n	23	24	18	19	53	50
Cycling at beginning of trial, %	52.5[b]	45.8[b]	0.0[b]	0.0[b]	3.8[b]	4.0[b]
Cycling after bull exposure, %	73.9[b]	87.5[b]	5.6[b]	36.8[c]	81.1[b]	80.0[b]
Calving (or birth) to start of cycling, days	398[b]	385[b]	112[b]	92[c]	59[b]	62[b]
Conceived to TAI, %	30.4[b]	50.0[b]	38.9[b]	42.1[b]	26.4[b]	46.0[c]
Final pregnancy rate, %	91.3[b]	87.5[b]	88.9[b]	89.5[b]	88.7[b]	94.0[b]

[a]NBE = No bull exposure; BE = Bull exposure.
[b,c]Different letters between columns within age depict significant differences, ($P < 0.05$).

cycling, pregnancy rate to TAI and final pregnancy rates were analyzed using Chi Square analysis.

Results

Trial 1

In the first trial there were more mature cows and second-calf cows cycling after bull exposure (Table 1; $P < 0.05$) compared to cows not exposed to bulls. However, there were greater numbers of second-calf cows cycling before initiation of the experiment in the bull exposed group compared to the non-exposed group. Calving to initiation of cyclic activity was reduced in the second-calf cows exposed to bulls (71 days) compared to the non-bull exposed group (85 days; Table 1; $P < 0.05$). There were no effects of treatment on percentage conceived to TAI or final pregnancy rates.

Trial 2

In 2003, 36.8% of second-calf cows exposed to bulls were cycling after bull exposure compared to the non-bull exposed (5.6%; Table 2; $P < 0.05$). The second-calf cows exposed to bulls had reduced calving to initiation of cyclic activity (92 days) compared to the non-bull exposed (112 days; Table 2; $P < 0.05$). The mature cows exposed to bulls had a significant increase in the percentage of females that conceived to TAI (46.0 %) compared to the non-bull exposed females (26.4%; Table 2; $P < 0.05$) but this was not repeated as significant in the second year.

(Continued on next page)

In 2004, both the second-calf cows and mature cows exposed to bulls had a higher percentage of females cycling after bull exposure (Table 3). The second-calf cows exposed to bulls had a reduced calving to initiation of cyclic activity (68 days) compared to the non-bull exposed (85 days; Table 3; $P < 0.05$). The second-calf cows exposed to bulls also had a higher rate of pregnancy (95.0%) compared to the control (76.2%). Mature cows exposed to bulls had a reduced calving to initiation of cycling (52 days) compared to non-bull exposed (61 days). Interestingly, the bull exposed mature cows had a lower final pregnancy rate compared to the non-bull exposed mature cows (Table 3; $P < 0.05$).

In conclusion, bull exposure in combination with a 7-day MGA feeding period does not consistently enhance conception rates to TAI or total pregnancy rates compared to cows treated for 7 days with MGA. The year to year differences may be due to body condition scores of cows in the herd prior to breeding. However, it does appear that the combination of a 7-day MGA administration with a GnRH injection on day 1 and $PGF_{2\alpha}$ on day 7 and TAI at 55 to 60 hours is a viable synchronization protocol to obtain 40-50% conception rates to TAI in cows of all ages.

Table 3. Results of Trial 2 conducted in 2004.

	AGE			
	2nd calf cows (2-3 yr of age)		Mature cows (> 3 yr of age)	
Treatment	NBE[a]	BE	NBE	BE
n	21	20	61	57
Cycling at beginning of trial, %	0.0[b]	0.0[b]	0.0[b]	0.0[b]
Cycling after bull exposure, %	38.1[b]	90.0[c]	80.0[b]	93.5[c]
Calving to start of cycling, days	85[b]	68[c]	61[b]	52[c]
Conceived to TAI, %	42.9[b]	40.0[b]	40.0[b]	51.6[b]
Final pregnancy rate, %	76.2[b]	95.0[c]	96.7[b]	87.1[c]

[a]NBE = No bull exposure; BE = Bull exposure.
[b,c]Different letters between columns within age depict significant differences, ($P < 0.05$).

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