

IMPROVING REPRODUCTIVE EFFICIENCY THROUGH ESTROUS
SYNCHRONIZATION IN THE TWO YEAR OLD BEEF COW

by

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A MASTER'S REPORT

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SUMMARY

Fall calving two-year old cows consisting of 148 Angus and 119 Angus x Maine-Anjou were divided into five groups to evaluate the effectiveness of Synchromate B treatment with and without short term calf removal on estrous synchronization and fertility. Cows that had their calves withdrawn after implant removal did show an advantage in the expression of estrus the first week of the breeding season when compared to the non-calf removal cows (73 vs. 64%; $P < .01$). Cows synchronized to coincide with the beginning of the breeding season showed an advantage over the early synchronized cows in having a higher percentage of cows in heat the first week of the breeding season (80 vs. 54%; $P < .01$). All Synchromate B treated cows had an advantage over the controls in expressing estrus the first week of the breeding season (68 vs. 32%; $P < .01$).

Females synchronized to coincide with the beginning of the breeding season showed an advantage over the early synchronized cows in the percentage conceiving the first week of the breeding season (51 vs. 33%; $P < .01$). All treated cows showed a higher percentage conceiving the first week of the breeding season than did the controls (42 vs. 15%; $P < .01$).

Synchromate B treatment was shown to be effective in helping control estrus at 30 days post partum. Cows having their next estrus cycle following Synchromate B treatment were shown to be more closely synchronized during the first week of the breeding season than were

the controls (54 vs. 32%; $P < .01$). Synchronate B treatment used in this experiment does not reduce fertility in the cow as indicated by the non-significant differences between the treatment groups. There was no significant difference in controlling estrus or on conception rates when the 5 mg or 6 mg of estradiol valerate was injected. The most effective treatment that resulted in a higher percentage of cows in estrus and conceiving earlier in the breeding season was the Synchronate B treatment to coincide with the beginning of the breeding season plus calf withdrawal at implant removal.

INTRODUCTION

Curl et al. (1968) reported that subcutaneous implants of progestin controlled estrus and ovulation in beef cows. Many reports of controlling estrus with the use of progestins have resulted in lower fertility (Wiltbank et al., 1965; Wiltbank et al., 1967). However, a procedure of feeding a progestin for nine days and injecting estradiol valerate on the second day resulted in fertility comparable to that of the controls (Wiltbank et al., 1967). Synchronate B treatment consisting of a norgestomet implant for nine days along with a single injection of estradiol valerate and norgestomet, has been shown to cause a high percentage of cows synchronized in a short period of time and resulted in a higher percent conceiving earlier in the breeding season when compared to the controls (Wiltbank, 1976, unpublished data).¹

¹Texas Agricultural Experiment Station, Beeville, Texas.

An injection of estradiol or estradiol valerate given in the early part of the cow's estrous cycle has been reported to regress the corpus luteum (Wiltbank et al., 1961). Occasionally, if a single injection of estradiol valerate was given to a cow during proestrus a cystic follicle will occur. To decrease the incidence of cystic follicles a progestin may be included in the injection. Progestin prevents an early surge of luteinizing hormone that was caused by the estradiol valerate which decreases the incidence of premature ovulations, resulting in less cystic follicles.

Interval from parturition to first estrus has been reported to be shortened when cows had their calves weaned early (Short et al., 1972). Wiltbank (1976, unpublished data) has shown that short term calf removal for 48 hours has brought a higher percentage of cows in heat in the first 21 days of the breeding season when compared to the controls. Cows coming into heat sooner after parturition makes the possibility of having more bred earlier in the breeding season. Lesmeister (1973) has shown that cows bred early in the breeding season and calving early in the calving season continued doing so when compared to cows bred late in the breeding season. Early born calves would have more time to grow until weaning and allow more time for cows' uterine involution before the breeding season. Early calving cows continued to have a longer reproductive life than the late calving cows. This indicates the importance of having cows bred early in the breeding season.

The objectives of this trial were to determine: (1) effects of calf removal versus non-calf removal with Synchromate B treatment on reproductive performance, (2) if hormonal treatment affected conception

rates, (3) how soon the hormonal treatment is effective following parturition, (4) if the estrous cycle is still synchronized on the next estrus following early Synchromate B treatment, and (5) effectiveness of an injection of either 5 mg or 6 mg of estradiol valerate.

EXPERIMENTAL PROCEDURE

¹ A total of two hundred sixty-seven fall calving first calf cows² consisting of 148 Angus, 110 Angus x Maine-Anjou, and 9 three-quarter Maine-Anjou x Angus were divided into five groups. Cows were evenly distributed among the groups with regard to days post partum and consisted of 44, 55, 48, 60, and 60 cows per group in 1, 2, 3, 4, and 5 respectively. The procedure that is referred to as the Synchromate B treatment consisted of a subcutaneous ear implant (SC-21009),³ trade name Synchromate Btm, containing 6 mg norgestomet. A single intramuscular injection of either 5 mg or 6 mg estradiol valerate in combination with 3 mg norgestomet in a solution of sesame oil and 10% benzyl alcohol was administered at the same time as the implant. Implants were removed in nine days. All groups were palpated when the hormone implants were administered; the control group was excluded.

Group 1, 2, 3, and 4 females were synchronized with the Synchromate B treatment. Group 1 and 3 females had their calves withdrawn

²Courtesy of Ramsey Ranch, El Dorado, Kansas.

³G. D. Searle and Company, Chicago, Illinois.

at implant removal until the cow exhibited signs of estrus or for 48 hours, whichever came first. Group 1 and 2 females were synchronized 21 days prior to the breeding season, and are referred to as the early synchronized groups. Group 3 and 4 females were synchronized to coincide with the beginning of the breeding season, December 5.

Group 5 was the control group and was not given any hormonal treatment, and their calves were not removed.

All cows were on native grass two months prior to the breeding season and were supplemented with 3 pounds of 20 percent protein cubes daily. Three weeks prior to the breeding season the cows were given 3 pounds milo, 2 pounds of 20 percent protein cubes, and 20-25 pounds of sedan and prairie hay.

Angus cows weighed from 850-900 pounds and the half and three-quarter Maine-Anjou cows weighed 925-1000 pounds at the beginning of the breeding season. All cows were artificially inseminated approximately 12 hours after exhibiting estrus.

Statistical procedures used in this experiment to determine the significance of the results were taken from Ostle (1963). The procedure used was the Chi-square Test of Goodness of Fit.

RESULTS AND DISCUSSION

Rectal palpations at the time hormonal pellets were implanted revealed the early synchronized groups (1 and 2) had less cycling when compared to groups synchronized to coincide with the beginning of the breeding season (3 and 4). The percentage of cows cycling at the time

they were implanted in groups 1, 2, 3, and 4 were 39, 49, 50, and 65, respectively, showing that the extra 21 days following parturition by females in groups 3 and 4 before implanting did allow more cows to express estrus.

There was a significant difference ($P < .01$) in synchronizing estrus within the first week of the breeding season between the treatment groups (Table 1). Early synchronized cows had a lower percentage that were still synchronized the first week of the breeding season than the cows synchronized to coincide with the beginning of the breeding season (54 vs. 80%; $P < .01$). But the early synchronized cows had a higher percent in estrus the first week of the breeding season when compared to the controls (54 vs. 32%; $P < .01$), indicating the cows exposed to the Synchromate B treatment were more closely synchronized their next estrus following treatment than were the controls. Although the difference is non-significant, the calf removal groups (1 and 3) still had a higher percentage showing estrus within the first 25 days of the breeding season when compared to the non-calf removal groups (2 and 4) (83 vs. 74%). Cows synchronized to coincide with the beginning of the breeding season had a higher percentage showing estrus within the first 25 days of the breeding season when compared to the early synchronized cows (86 vs. 69%), although non-significant.

Synchromate B treatment can be used effectively in helping control estrus as early as 30 days following parturition as indicated by the non-significant differences within the treatment groups (Table 2).

There was a significant difference ($P < .05$) in the percentage of cows showing estrus within 48 hours after implant removal between

TABLE 1. EFFECT OF TREATMENT ON ESTRUS AND CONCEPTION RATES

Treatment	Showing Estrus			Pregnant		
	1st week	1st 25 days	Within 90 days	1st week	1st 25 days	Within 90 days
Group 1 Early syn. Calf removal ^a	26/44 = 59%	32/44 = 73%	44/44 = 100%	14/44 = 32%	23/44 = 52%	32/44 = 73%
Group 2 Early syn. Non-calf removal	28/55 = 51%	36/55 = 65%	53/55 = 96%	19/55 = 35%	25/55 = 45%	32/55 = 58%
Group 3 Regular syn. Calf removal ^b	41/48 = 85%	44/48 = 92%	48/48 = 100%	25/48 = 52%	29/48 = 60%	35/48 = 73%
Group 4 Regular syn. Non-calf removal	46/60 = 77%	49/60 = 82%	60/60 = 100%	30/60 = 50%	33/60 = 55%	44/60 = 73%
Group 5 Control	19/60 = 32%	43/60 = 72%	60/60 = 100%	9/60 = 15%	24/60 = 40%	33/60 = 55%

^a Early syn. refers to cows synchronized 21 days prior to the breeding season.

^b Regular syn. refers to cows synchronized to coincide with the beginning of the breeding season.

TABLE 2. PROPORTION SHOWING ESTRUS WITHIN 48 HOURS AFTER IMPLANT REMOVAL

Treatment	Days from parturition to treatment			
	< 30	30-45	46-60	61-75
Group 1 Early syn. ^a Calf removal	4/ 4 = 100%	10/14 = 71%	14/21 = 67%	5/ 5 = 100% -- ^b
Group 2 Early syn. Non-calf removal	1/ 5 = 40%	8/14 = 57%	4/27 = 15%	2/ 5 = 40% 1/ 4 = 25%
Group 3 Regular syn. ^c Calf removal	1/ 1 = 100%	5/ 6 = 83%	7/ 8 = 87%	13/16 = 81% 14/17 = 82%
Group 4 Regular syn. Non-calf removal	0/ 2 = 0%	3/ 4 = 75%	8/11 = 73%	10/18 = 55% 22/25 = 88%
Total	7/12 = 58%	26/38 = 68%	33/67 = 49%	30/44 = 68% 37/46 = 80%

^a Early syn. refers to cows synchronized 21 days prior to the breeding season.

^b None in group 1 farther than 75 days from parturition.

^c Regular syn. refers to cows synchronized to coincide with the beginning of the breeding season.

the calf removal groups and the non-calf removal groups (79 vs. 52%). These results agree with Wiltbank (1976, unpublished data) that short term calf removal will help a higher percentage of cows express estrus when compared to non-calf removal.

There were no significant differences between the treatment groups when the conception rates of the cows were determined for the first week, first 25 days or within 90 days of the breeding season (Table 3). Treatment groups 1 and 2 which were bred at their next estrus following hormonal treatment did not have a higher conception rate the first week of the breeding season when compared to the cows in groups 3 and 4, which were bred at the estrus following hormonal treatment (61 vs. 63%). Although the difference is non-significant, the control group had the lowest percent conceiving of those inseminated throughout the experiment (55 vs. 73%). First week conception rates were 61, 63, and 47 percent when cows in groups 1 and 2, 3 and 4, and the controls were compared, which are non-significant differences. Cows conceiving of those inseminated the first 25 days of the breeding season were 70, 67, and 56 percent for combined groups 1 and 2, 3 and 4, and the controls, respectively; the differences were not significant. Synchromate B treatment does not reduce conception rates as indicated by the non-significant differences within the treatment groups.

To determine if there were differences between individual breeds a conception rate check within each treatment group was made. There were no significant differences in conception rates between the individual breeds.

TABLE 3. EFFECT OF TREATMENT ON CONCEPTION RATES
AT VARIOUS TIMES DURING BREEDING SEASON

Treatment	Conceived/inseminated		
	Days of breeding season		
	First week	First 25 days	Within 90 days
Group 1			
Early syn. ^a			
Calf removal	14/26 = 54%	23/72 = 72%	32/44 = 73%
Group 2			
Early syn.			
Non-calf removal	19/28 = 68%	25/36 = 69%	32/53 = 60%
Group 3			
Regular syn. ^b			
Calf removal	25/41 = 61%	29/44 = 66%	35/48 = 73%
Group 4			
Regular syn.			
Non-calf removal	30/46 = 65%	33/49 = 67%	44/60 = 73%
Group 5			
Control	9/19 = 47%	24/43 = 56%	33/60 = 55%

^a Early syn. refers to cows synchronized 21 days prior to the breeding season.

^b Regular syn. refers to cows synchronized to coincide with the beginning of the breeding season.

There was no significant difference between the cows that received either the 5 mg or 6 mg of estradiol valerate injection on the expression of estrus or on fertility, indicating that either amount of estradiol valerate can be used effectively in the Synchromate B treatment to help control estrus.

There was a significant difference ($P < .01$) in the percentage conceived within the first week of the breeding season between the treatment groups (Table 1). Cows synchronized to coincide with the beginning of the breeding season showed a higher percentage conceiving the first week of the breeding season when compared to the early synchronized cows (51 vs. 33%; $P < .01$). Still, the early synchronized cows had a higher percentage conceiving the first week of the breeding season than did the controls (33 vs. 15%; $P < .01$). There was no significant difference between the groups in percent conceiving the first 25 days of the breeding season, but the trend of the first week conception rates applies to the first 25 days also. The cows synchronized to coincide with the beginning of the breeding season had a higher percentage, although non-significant, conceiving during the first week than the controls had the first 25 days of the breeding season.

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More cows with calves removed, (group 1 and 3), showed estrus within 48 hours after implant removal than in those with calves, (group 2 and 4), (79 vs. 52%; $P < .05$). Cows synchronized to coincide with the beginning of the breeding season, when compared to the early synchronized cows, had a higher percentage in estrus the first week of the breeding season (80 vs. 54%; $P < .01$), and conceiving the first week of the breeding season (51 vs. 33%; $P < .01$). All treated females, when compared to the controls, had a higher percentage in estrus the first week of the breeding season (68 vs. 32%; $P < .01$),

and conceiving the first week of the breeding season (42 vs. 15%; $P < 01$). Although non-significant, the calf removal cows had a higher percentage of cows in estrus (83 vs. 74%;) and conceiving the first 25 days of the breeding season (52 vs. 48%) than did the non-calf removal cows. The cows synchronized to coincide with the beginning of the breeding season when compared to the early synchronized cows, showed a higher percentage, although non-significant, in estrus and conceiving the first 25 days of the breeding season than did the controls. Synchromate B treatment was shown to be effective in controlling estrus at 30 days post partum. There was no significant difference between the 5 mg and 6 mg injection of estradiol valerate in helping control estrus or on conception rates. Synchromate B treatment, used in this experiment, does not reduce fertility in the cow.