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Artificial insemination (A.I.) has been commercially available to beef producers for nearly 20 years. However, most beef cattlemen do not take advantage of A.I. because of the labor and management required during the long breeding season. If the breeding season could be condensed into a few days through estrus synchronization, this disadvantage could be overcome.

Most methods of estrus synchronization have involved the feeding of a synthetic progestin for several days. These compounds prevent estrus and ovulation until 2 to 8 days following their withdrawal. However, reduced fertility at the first estrus following withdrawal has been a problem. It is not understood why fertility is subnormal at this estrus.

The purpose of this study was to determine the effect of melengestrol acetate (MGA), a synchronizing compound, on the rate of ovum transport in the beef cow. Egg development, ovarian conditions and fertility were also observed.

Experimental Procedure

This study involved 20 Angus and 14 Charolais cows which were found open at the end of a 70-day breeding season and 13 nulliparous Angus x Hereford crossbred heifers. The Angus and Charolais cows averaged 825 and 1,075 pounds, respectively, while the crossbred heifers averaged 770 pounds.

All females were randomly assigned to control or treatment groups according to breed. The estrus synchronization treatment consisted of 0.5 mg of MGA daily for 15 days to each individual. All females received 4 to 5 pounds of a corn-oats mixture per day plus alfalfa hay. Females were maintained in open dry lots and were given water and minerals free choice.

The cattle were checked for estrus (heat) 2 to 3 times daily. Ovarian activity was determined by rectal palpation. The cows were examined at the beginning and end of estrus and then every 4 to 8 hours to determine time of ovulation. The cattle were inseminated about 12 hours following the last observed standing heat.

At approximately 15, 30, 45, 60 or 75 hours after ovulation, the ovulating ovary and adjacent oviduct were surgically removed. The overall length of the oviduct was noted and it was divided into four equal segments. The part nearest the ovary was designated as segment I. Each segment was flushed with 5 ml of physiological saline. The flushings were examined under a microscope for the presence of an egg. An egg was called fertile if it possessed two or more blastomeres of equal size. The ovary was also examined for follicular abnormalities.

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Results

Estrus was successfully inhibited during the 15-day feeding period in all females when fed 0.5 mg MGA per head daily. The mean interval from last MGA feeding until the onset of estrus was 4.97 $\pm$ 0.68 days in 42 of 45 head expressing estrus.

There were 14 (60.9%) and 9 (33.3%) ova collected from control and MGA-treated females, respectively (table 1). These ova were recovered from the flushings of 50 oviducts. Some eggs recovered at 15 hours post-ovulation from MGA-fed cows were recovered from segment III. In control cows, eggs had not reached this segment until 30 hours post-ovulation. One ovum recovered from a MGA-treated cow was found in segment IV at 48 hours, while control eggs were still in segment III at 80 hours following ovulation. These results suggest that synchronizing estrus with MGA may increase the rate of ovum transport through the oviducts.

There was no significant ($P>.10$) difference in fertilization rate between control and MGA-fed cattle. The low fertilization rates in table 1 are due in part to an inexperienced technician and in part to poor quality semen from one bull. When data from cows bred with semen from this bull are deleted (table 2), there are significant differences in fertilization rates between treatments. This reduction in fertility of MGA-treated cows was observed within both Charolais ($P<.05$) and Angus ($P<.10$) cows (table 2).

There were 71 units involved in this study, of which 45 were MGA-treated and 26 were controls. Eleven of 45 MGA-treated females had abnormal follicles (table 3). Five of these follicles were cystic, five appeared to be luteinizing without ovulating and one "delayed follicle" had not ovulated by several hours after the expected time of ovulation. In a few more days this follicle probably would have been called cystic or lutenized. Abnormalities were observed in only two control cattle, one cystic follicle and one "delayed follicle."

Summary

Although nonsignificant, the results of this study suggest that synchronizing estrus with MGA may increase the rate of ovum transport through the oviduct. MGA caused an increase ($P<.05$) in follicular abnormalities in nulliparous heifers. Fertility was decreased ($P<.01$) in the Angus and Charolais cows fed MGA. As a result of this study, it can be postulated that MGA synchronization causes reduced fertility at the first estrus post-synchrony by (1) decreasing fertilization rate, (2) increasing the rate of ova transport through the oviduct and (3) increasing the frequency of ovarian abnormalities.

Table 1. Comparison of Ovum Recovery Rates, Fertility and Ovum Abnormalities in Control and MGA-Fed Females

Trait	Control	0.5 mg MGA
Recovery attempts	23	27
Eggs recovered	14(60.9)[a]	9(33.3)
Eggs fertile	6(42.9)	1(11.1)
Normal eggs unfertile	5(35.7)	4(44.4)
Abnormal eggs	3[b](21.4)	4[c](44.4)

[a]Values in parentheses are percentages.
[b]These abnormalities include two ova which were oval in shape and one ovum with an irregular vitelline membrane.
[c]These abnormalities include one ovum which was oval in shape, one ovum with an irregular vitelline membrane and two ova with ruptured zona pellucida.

Table 2. Comparison of Fertility in Control and MGA-Treated Cows

	Angus		Charolais		All cows	
Trait	Control	MGA	Control	MGA	Control	MGA
Eggs recovered	3	3	4	4	7	7
Eggs fertile	3(100.0)[a]	1(33.3)	3(75.0)*	0	6(85.7)**	1(14.3)

[a]Values in parentheses are percentages.
*P<.05.
**P<.01.

Table 3. Frequency of Ovarian Abnormalities in Control and MGA-Fed Females

Trait	Control	0.5 mg MGA
Ovaries[a]	26	45
Abnormal ovaries[b]	2(7.7)[c]	11(24.5)
Cystic follicles	1(3.9)	5(11.1)
"Luteinized" follicles	0	5(11.1)
"Delayed" follicles	1(3.9)	1(2.2)

[a]Total ovaries observed.
[b]Total ovarian abnormalities.
[c]Values in parentheses indicate percent of total within each treatment.