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Abstract

Four trials were conducted to evaluate the effectiveness of Melegestrol Acetate (MGA ®) and prostaglandin (PGF) in inducing and synchronizing estrus. In trial 1, treated heifers were fed MGA for 7 days and given a PGF injection on either the first or last day of MGA feeding. The 7-day estrus response was higher (P<.01) for treated heifers than untreated controls. In trial 2, treated cows were fed MGA for 7 days and given a PGF Injection on the last day of MGA feeding or 13 days after the last day of MGA feeding. The 7-day estrus response was also higher (P<.01) in treated cows. In trial 3, 59 cows were fed MGA for 7 days followed by a PGF injection, and exposed to bulls for 66 days. The MGA-PGF treatment was ineffective in synchronizing estrus and hastening conception. In trial 4, feeding MGA for 7 days successfully synchronized estrus in. cycling cows, but first service conception rates were reduced by 10% in the Kansas study and by 16% in a four state study.

Keywords

Cattlemen's Day, 1987; Kansas Agricultural Experiment Station contribution; no. 87-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 514; Beef; MGA; Prostaglandin; Estrus; Synchronization

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Effects of MGA[1] and Prostaglandin on Estrus Induction and Synchronization in Cows and Heifers[2]

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Summary

Four trials were conducted to evaluate the effectiveness of Melegestrol Acetate (MGA®) and prostaglandin (PGF) in inducing and synchronizing estrus.

In trial 1, treated heifers were fed MGA for 7 days and given a PGF injection on either the first or last day of MGA feeding. The 7-day estrus response was higher ($P<.01$) for treated heifers than untreated controls.

In trial 2, treated cows were fed MGA for 7 days and given a PGF injection on the last day of MGA feeding or 13 days after the last day of MGA feeding. The 7-day estrus response was also higher ($P<.01$) in treated cows.

In trial 3, 59 cows were fed MGA for 7 days followed by a PGF injection, and exposed to bulls for 66 days. The MGA-PGF treatment was ineffective in synchronizing estrus and hastening conception.

In trial 4, feeding MGA for 7 days successfully synchronized estrus in cycling cows, but first service conception rates were reduced by 10% in the Kansas study and by 16% in a four state study.

Introduction

Estrus synchronization increases the number of females that can be inseminated or mated naturally during a short period, thus increasing the number of cows bred early in the breeding season or making artificial insemination (AI) more practical. Some synchronization products are costly and others require large amounts of labor. Melegestrol Acetate (MGA®), an orally active progestin, has traditionally been used to suppress estrus and increase gain and efficiency in feedlot heifers. It is inexpensive (2 to 3 cents per day) and easy to administer. Research in the 1960's showed MGA successfully synchronized estrus. However, at

[1] MGA is a progestational steroid that is approved for use in feedlot heifers and is marketed by the Upjohn Company.

[2] Sincere appreciation is expressed to Joe Thielen and Family, Dorrance, Ks for providing cattle, facilities, and management for Trials 1 and 2; to Gardiner Angus Ranch, Ashland, Ks for providing the bulls used in Trial 3; and to R. L. Dickinson, Dickinson Simmentals, Gorham, Ks for providing cattle, facilities and management for Trial 4.

that time MGA was fed for 16 to 18 days, which tended to impair first service conception rates. Recent research has shown that feeding MGA for 7 to 9 days combined with a prostaglandin (PGF) injection, synchronizes and induces estrus without lowering first service conception rates below satisfactory levels. Progestin administered prior to the breeding season also increases cyclicity in some non-cycling females, particularly heifers.

We conducted four trials, three with artificial insemination (AI) and one with natural mating, to determine the effectiveness of combined MGA feeding and PGF injection for estrus synchronization.

Experimental Procedures

Trial 1: One hundred seven crossbred heifers were allotted to 1) untreated control, 2) 7 days of MGA feeding (0.5 mg/head/day) with a PGF injection (5 ml Lutalyse[5]) on the last day (MGA-PG7), and 3) 7 days of MGA feeding with a PGF injection on the first day (PG1-MGA). The MGA was incorporated into 1 lb of ground milo.

Heifers were heat checked three times daily and those detected in estrus were inseminated approximately 12 hours later. Heifers were AI'd for 21 days followed by exposure to clean-up bulls for 50 days. Pregnancy and conception rates were determined by fetal aging via rectal palpation.

Trial 2: One hundred forty-nine crossbred cows were allotted to 1) untreated control, 2) PGF injection given 13 days after 7 days of MGA feeding (MGA-13-PG), and 3) PGF injection given on the last (7th) day of MGA feeding (MGA-PG7). All cows were on pasture. Because of previous problems with inadequate MGA consumption on lush spring pasture, treated cows were gathered into a small lot and given MGA (0.66 mg/head/day), incorporated into 2 lb of ground milo and fed in bunks.

Cows were heat checked three times daily and those detected in estrus were inseminated approximately 12 hours later. Synchronized cows were AI'd for 7 days while control cows were AI'd for 21 days. All cows were exposed to clean-up bulls for 130 days. Pregnancy and conception rates were determined by fetal aging via rectal palpation.

Trial 3: This trial was conducted to determine if naturally mated cows treated with MGA + PGF (MGA-PGF, n=59) conceived earlier in the breeding season than naturally mated non-synchronized cows (Control, n=119). MGA (0.75 mg/head/day) was fed in 1.5 lb cubes daily for 8 days. The PGF injection (5 ml Lutalyse) was given on the last day of MGA feeding. Prior to the breeding season, all 178 Hereford and Angus x Hereford cows had blood samples taken 10 days apart. Cows with less than 1 ng/ml serum progesterone at both bleedings were considered non-cycling. Cows were weighed and condition scored prior to allotting to treatment.

[5]Lutalyse is a prostaglandin developed and marketed by the Upjohn Company.

Because three equal sized pastures (about 640 acres each) were available, MGA-PGF cows were kept in one pasture and control cows were split into two equal groups (n=approx. 60), one group per pasture.

During the 66-day breeding season, each group (two control, one MGA-PGF) was exposed to two yearling Angus bulls. Bulls were fitted with chin ball markers for the first 7 days of the breeding season so cycling activity could be checked.

To determine breeding activity, each group of cows was checked for at least 1 hour each morning and evening during the first 7 days of the breeding season. Any cows observed being bred or marked were recorded. Date of conception was estimated by fetal aging via rectal palpation.

Trial 4: One hundred cows were allotted to 1) untreated control (n=29), or 2) 7 days of MGA feeding (0.5 mg/hd/day) with a PGF injection on the last day (MGA-PG7, n=71). Cows were AI'd after estrus detection for 21 days. First service conception rates were based on 7-day estrus response in treated cows and 21-day estrus response in the control cows.

This same experiment was conducted at 3 other locations in the United States as part of a four-state project with a total of 397 cows and heifers being involved in an identical experimental design.

Results and Discussion

Trial 1: Results shown in Table 21.1 indicate that the 7-day estrus response was higher ($P<.01$) for both groups of treated heifers than for untreated controls. Degree of synchrony, first service conception rates and overall pregnancy rates were similar across all three groups. Both combinations of MGA and PGF were successful in synchronizing estrus. The PG1-MGA treated group had a slightly higher first service conception rate than the other two groups.

Table 21.1. Effect of MGA and PGF on Reproductive Parameters of Heifers

Treatment	No. Heifers	Estrus Response[1] 7-day	Estrus Response[1] 21-day	Degree of Synchrony[2]	1st Service Conception[3] Rate	Overall Pregnancy[4] Rate
PG1-MGA	15	12/15=80%[b]	14/15=93.3%	6/12=50.0%	7/12=58.3%	15/15=100%
MGA-PG7	52	37/52=71.2%[b]	50/52=96.2%	17/37=45.9%	14/37=37.8%	47/52=90.4%
Control	40	13/40=32.5%[a]	38/40=95%	-----	19/38=50%	35/40=87.5%

[ab]Numbers within columns with different superscripts differ ($P<.01$).
[1]Estrus response = females in estrus/number treated.
[2]Degree of synchrony = number in estrus in peak 24 hr/number in estrus.
[3]Conception rate = number conceived to AI/number inseminated.
[4]Overall pregnancy rate = number conceived during the total breeding season/number treated.

Trial 2: Results in Table 21.2 indicate that the 7-day estrus response was higher (P<.01) for both groups of treated cows than for the untreated controls. The average days postcalving, degree of synchrony, conception rates and overall pregnancy rates were similar across all three groups.

The low percentage of treated cows showing estrus within 7 days was attributed to the low percentage of cows cycling. Only about 21% of control cows cycled within 21 days.

Table 21.2. Effect of MGA and PGF on Reproductive Parameters of Cows

Treatment	No. Cows	Days Postcalving 5/27/86	Estrus Response[1] 7 day	21 day	Degree of Synchrony[2]	1st Service[3] Conception Rate	Overall[4] Pregnancy Rate
MGA-PG7	52	69.7	19/52=36.5%	----	8/19=42.1%	12/19=63.2%	49/52=94.2%
MGA-13-PG	49	72.2	20/49=40.8%	----	12/20=60.0%	9/20=45%	46/49=93.9%
Control	48	71.4	5/48=10.4%	10/48=20.8%	-----	4/10=40.0%	46/48=95.8%

[ab]Numbers within columns with different superscripts differ (P<.01).
[1]Estrus response = females in estrus/number mated.
[2]Degree of synchrony = number in estrus in peak 24 hr period/number in estrus.
[3]Conception rate = number conceived to AI/number inseminated.
[4]Overall pregnancy rate = number conceived during the total breeding season/number in the group.

Trial 3: Table 21.3 indicates that a higher percentage of Control cows were cycling compared to MGA-PGF cows, even though their average days postcalving was only 4 days greater. Weights and condition scores prior to breeding season were similar for both groups. More importantly, Table 21.3 shows that cows did not respond to the MGA-PGF treatment. Only 8% of the cows were observed bred during the first 7 days of the breeding season. Lack of a response to treatment is not explainable.

Even though less than half of the cows in either group were cycling prior to the breeding season, most of the cows eventually cycled and became pregnant, as indicated by the low number of open cows. Based on fetal aging, the average date of conception for both groups was June 15, 26 days after the start of the breeding season. In this trial the MGA-PGF treatment was ineffective in increasing the number of cows conceiving early in the breeding season.

Trial 4: Results shown in Table 21.4 indicate that 59% of the MGA-PG7 treated cows showed estrus within 7 days as compared to only 17% of the control cows. This compared to 68% and 32% considering all 4 state locations. First service conception rates were reduced by 10% (45% vs. 55%) in the Kansas trial and by 16% (50% vs. 66%) in the four-state summary.

Table 21.3. Summary of Natural Mated Control and MGA-PGF Treated Cows

Treatment	No. Cows	Prior to Breeding Season: Avg. Days Postcalving	Prior to Breeding Season: % Cows Cycling	Prior to Breeding Season: Avg. Wt. (lb)	Prior to Breeding Season: Avg. C.S.	1st 7 Days of Breeding Season: % Cows Observed Bred	1st 7 Days of Breeding Season: % Cows Marked but not Observed Bred	After Breeding Season: Avg. Days Pregnant	After Breeding Season: % Open
MGA-PGF	59	57	32%	910	4.7	8%	5%	122	3%
Control	119	61	45%	913	4.7	8%	13%	122	4%

Table 21.4. Effect of MGA and PGF on Reproductive Parameters of Cows

Treatment	No. Cows	Estrus Response 7-day	Estrus Response 21-day	1st Service Conception Rate
MGA				
Upjohn	52	40/52=77%	45/52=87%	19/40=48%
Ohio	50	34/50=68%	39/50=78%	17/34=50%
Kansas	71	42/71=59%	55/71=77%	19/42=45%
Virginia	50	36/50=72%	49/50=98%	21/36=58%
Overall	223	152/223=68%	188/223=84%	76/152=50%
Control				
Upjohn	52	17/52=33%	45/52=87%	30/45=67%
Ohio	49	14/49=29%	37/49=76%	25/37=68%
Kansas	29	5/29=17%	20/29=69%	11/20=55%
Virginia	44	22/44=45%	43/44=98%	29/43=67%
pverall	174	56/174=32%	145/174=83%	95/145=66%