INDUCING ESTRUS IN BEEF REPLACEMENT HEIFERS WITH MGA

G. E. Selk[1], C. A. McPeake[2], and R. P. Wettemann[3]

Story in Brief

Seventy-five yearling Polled Hereford, Hereford, and Hereford-Angus heifers were used to evaluate the effectiveness of melengestrol acetate (MGA), a synthetic progestin, as an oral estrus induction compound. MGA is a product of the Upjohn Co., Kalamazoo, Michigan. Heifers were grown under three different management regimes. Twenty-five Polled Hereford heifers were fed grain (14% crude protein) and free choice grass hay. Twenty-four of the remaining heifers were wintered on wheat pasture and and native range and 26 heifers were wintered on native range and cottonseed meal. Treatment heifers were fed .5 mg of MGA per day for 16 days and 16 days later given 25 mg prostaglandin. Control heifers received two injections of prostaglandin 11 days apart. Cyclicity was determined by serum progesterone before and after synchronization treatments. A treatment by management interaction was the result of a high percentage of cyclicity in the Polled Hereford heifers. The MGA treatment significantly increased the percentage of the remaining 50 heifers that were cycling at start of the breeding season.

Key words: beef heifers, MGA, estrus, induction .

Introduction

Beef replacement heifers usually enter their first breeding season at 14 to 15 months of age and are expected to give birth to their first calf at about 24 months of age. Many beef producers choose to breed replacement heifers 3 to 4 weeks ahead of the mature cows. This allows the first-calf heifers a longer interval between calving and rebreeding, and results in a more uniform calving time for the entire herd. Replacement heifers are often weaned in late summer or fall and expected to grow to 65% of their projected mature weight in the next 150 days. Therefore most replacement heifers must gain at least 200 pounds in 5 months when forage standing in pastures is often low in quality. Often a portion of the heifers are too light in weight and/or too thin in body condition to reach puberty when the breeding season begins. Consequently, a research trial was conducted to evaluate the effectiveness of a synthetic oral progestin to enhance the onset of puberty in beef replacement heifers. The progestin used was melengestrol acetate (MGA) which (at this printing) is currently FDA approved only for feedlot and pasture heifers intended for slaughter. MGA is routinely used to suppress estrus activity in feedlot heifers and is a trademarked product of the Upjohn Co., Kalamazoo, Michigan.

[1]Assistant Professor [2]Associate Professor [3]Regents Professor

Materials and Methods

Seventy-five beef replacement heifers were grown under three different management regimes. Twenty-five purebred Polled Hereford heifers were fed a 14% crude protein grain mix at the rate of 1% of body weight per head per day. Six pounds per day of grain was the maximum fed. In addition, these heifers received free choice access to grass hay in large round bales. Twenty-four Hereford and Hereford-Angus crossbred heifers had grazed wheat pasture until March 15, about 15 days before the start of the experiment. During that two-week period, they were placed on native winter range and fed 1 pound per day cottonseed meal supplement. The third group of twenty-six Hereford and Hereford-Angus heifers were wintered on native range and cottonseed meal supplement. Each group was blocked by weight, age, and breed into treatment (MGA fed) and control heifers.

All heifers were fed 6 pounds of a 14% grain mix with free choice grass hay during a one week acclimation period and during the synchronization period. Treatment heifers received 0.5 mg of MGA per head per day for 16 days. Sixteen days after the withdrawal of MGA, treatment heifers were given a 25 mg prostaglandin injection. Control heifers were synchronized using 2 injections of prostaglandin eleven days apart, with the second injection of the control heifers coinciding with the prostaglandin injection of the treatment heifers.

Two tail-vein blood samples (10 ml) were taken one week apart before the treatment with MGA began. In addition, two weekly blood samples were obtained following the prostaglandin administration. These samples were analyzed for serum progesterone content to determine ovarian luteal activity before and after treatment. A heifer was considered to be cyclic if the progesterone content one of the two samples exceeded 1.5 ng/ml.

Body weights and body condition scores were recorded for each heifer when the first blood sample was obtained. Body condition scores (scale: 1 = emaciated; 5 = thin to moderate; 9 = very obese) were assigned by two individual scorers.

All heifers were detected for estrus following the prostaglandin injection. Those heifers found in estrus were artificially inseminated approximately 12 hours following the first sign of standing heat. Semen from three Polled Hereford bulls was used to breed the heifers by two experienced A. I. technicicans. The purebred Polled Hereford heifers were left for continued heat detection and were re-inseminated for second and third services if necessary. The remainder of the heifers (wheat and native) were taken to natural breeding pastures for 45 days and placed with Angus bulls. The breed composition of the calves was used to determine whether the calf was sire by artificial or natural insemination.

The proportion of heifers with ovarian luteal activity (cycling activity) was compared between treatments before and after synchronization treatments using chi-square tests.

Results and Discussion

The mean weights and body condition scores of the heifers in the three different management regimes are displayed in table 1. The purebred heifers were heavier in body weight than the other two groups. Those heifers wintered on native range were thinner in body condition than the other heifers in the study. Although the wheat pasture heifers

Table 1. Mean weights and body condition scores (BCS) of heifers from three management regimes.

	Weight (lbs)	BCS
Purebred Polled Herefords	753[a]	5.5[a]
Wheat Pasture (Commercial)	614[b]	5.6[a]
Native range (Commercial)	547[c]	4.8[b]

[ab]Values in same column with similar superscripts are not different ($P > .05$)

were in similar body condition to the purebred heifers, their weight and breed composition was more similar to the native range heifers. Furthermore, the wheat pasture heifers were subjected to similar diets of the native range heifers for 2 weeks prior to the synchronization trial. Both the wheat pasture and native heifers had lesser bodyweights than the recommended 65% of expected mature weight.

A treatment by management regime interaction ($P < .05$) suggested that the purebred heifers should be analyzed separately from the two groups. Because no such interaction was detected between the native and wheat pasture heifers, they were combined when analyzing the percentage of cycling heifers before and after the trial. These two groups combined are labeled "commercial" heifers.

Table 2 illustrates the percentage of control and MGA-treated heifers that had ovarian luteal activity before and after synchronization. Also included is the percentage of heifers in each

Table 2. Means of percentage control and MGA-treated heifers with ovarian luteal activity before and after treatments and percentage detected in synchronized heat.

	% Cycling Before	% Cycling After	% Detected in Heat
Purebred Polled Herefords (n = 25)			
Control	85[a]	77[a]	92[a]
MGA	83[a]	83[a]	92[a]
Commercial heifers (n = 50)			
Control	44[b]	52[b]	48[b]
MGA	52[b]	84[a]	80[a]

[ab]Values in same row or column with similar superscripts are not different ($P > .05$)

group that were detected in heat within 6 days following the prostaglandin injection. The heavier body weights of the purebreds are primary factors causing the greater percentage of purebreds to have luteal activity (cycling) before the synchronization programs began. The very high percentage of purebred heifers that were cycling before the treatment began left little opportunity to induce estrus in these heifers. However the similarity in cycling activity before and after MGA feeding indicated that estrous activity was not impaired by the oral progestin.

The commercial heifers had a lower percentage cycling (48%) at the beginning of the treatment. No significant increase in the percentage cycling occurred in the control group. This small numerical increase was expected due to the BCS, weight of the heifers, and the length of time (32 days) of the trial. However, there was a significant increase ($P < .05$) in the percentage cycling in the MGA-fed commercial heifers. This increase represented nearly one-half of the previously non-cycling heifers. MGA-fed commercial heifers had significantly greater ($P < .05$) percentages that had luteal activity and were detected in estrus than the commercial control heifers.

There was no significant difference due to MGA in the time to standing estrus or insemination following prostaglandin treatment. One-half (50%) of the cycling control heifers were inseminated on day 3 following the second prostaglandin injection, whereas 63% of the cycling MGA-fed heifers were inseminated on day 3 after prostaglandin injection.

The first-service non-return rate of the MGA-fed purebred heifers (61%) was not different from that of the control purebred heifers (48%). The first-service conception rate of the MGA-fed commercial heifers was quite good. Eighteen of the twenty (90%) MGA-fed commercial heifers detected in estrus conceived to artificial insemination. The first service conception rate of the control heifers also was quite acceptable with 7 of 12 (58%) heifers giving birth to A.I. sired calves. Certainly no detrimental effects on fertility were observed with the use of the MGA-prostaglandin treatment. However, it is important to note that the heifers were bred on the second heat following the MGA withdrawal.

Many beef heifers are grown at a low rate of gain and are underweight when they reach a desireable breeding age. This results in a low percentage of cycling heifers at the beginning of a breeding season. In this study, short term feeding of MGA (14 - 16 days) induced the initiation of estrus in approximately 50% of underweight beef heifers that were 13 - 18 months of age.