SUMMARY

Five hundred and forty-three postpartum beef cows were administered norgestomet and estradiol valerate (Syncro-Mate B®; SMB) to synchronize estrus. Before norgestomet and estradiol treatments the cows were randomly assigned to two groups. One group of cows (n = 281) was fed 0.5 mg of melengestrol acetate (MGA) per head per day for ten days while the other group of cows (n = 257) served as controls. All cows were bled for progesterone concentrations at the beginning of the MGA feeding (d -21), before the SMB treatment, and at the time of artificial insemination (AI). Twenty-eight days after AI, cows in both groups were examined for pregnancy using transrectal ultrasonography. MGA feeding increased (P=.02) synchronization rates in the estrous-cycling females; however, MGA feeding did not improve (P>.01) pregnancy rates. In summary, MGA may be used to improve synchronization rates of estrus-cycling females, but the improvement is likely not warranted unless higher pregnancy rates are observed. For example, if the overall pregnancy rate would have been 55%, the improvement in synchronization would have yielded a 4% overall increase in pregnancy rates.

INTRODUCTION

With the increased use of AI, estrus synchronization has allowed for a more uniformed breeding and calving schedule. But in order for estrus synchronization to become more valuable among beef cow-calf producers, a program needs to be able to synchronize estrus in beef females accurately, for a low cost, and with minimal animal handling. There are several procedures used to synchronize estrus and ovulation. Syncro-Mate B contains a hydron ear implant (6.0 mg norgestomet) and an intramuscular injection containing norgestomet (3.0 mg) and estradiol valerate (5.0 mg) in sesame seed oil and benzyl alcohol. This method is only effective in beef females which are not in metestrus, approximately 85% of a herd at a given time (Kesler and Favero, 1996). Feeding an oral progestin, such as melengesterol acetate (MGA), for a period of 14 days then administering an injection of PGF2α on d 31 is another method of estrus-synchronization. MGA suppresses estrus by inhibiting the ovulatory surge of luteinizing hormone (LH) (Zimbelman et al., 1970; Yelich et al., 1997), it also has the potential of inducing estrus in prepubertal heifers (Patterson et al., 1989). The feeding of progestins such as MGA is not used as a means of synchronizing estrus because of the decrease in pregnancy rates after A.I. at the synchronized estrus (Beal and Good, 1986).

Studies have been conducted to research the use of MGA with other forms of synchronization, such as a PGF2α injection, or estradiol valerate. The objectives of this study were to determine if MGA used in conjunction with SMB, would improve estrus-synchronization and pregnancy rates of the beef cow.
MATERIALS AND METHODS

Five-hundred and forty three multiparous postpartum beef cows at the University of Illinois, Dixon Springs Agriculture Center, (Simpson, Illinois) were used for this experiment. Five cows were omitted due to lost SMB implants. Because of a concurrent trial with these same animals, 41 cows were omitted from the pregnancy results due to lost norgestomet implants used to maintain pregnancy in cows without a corpus luteum. Norgestomet implants administered after insemination have been shown to increase fertility in synchronized females when cows from the same herd without the norgestomet implant had lower pregnancy rates (Kesler et al., 1997a). All cows were kept on fescue mix pasture and supplemented with a complete vitamin and mineral mixture to meet NRC requirements (NRC, 1996). Females were assigned randomly to two groups, one group of cows (n=281) were fed 0.5 mg of MGA per head per day while the others (n=221) served as a control. MGA was fed on d -21 through d -12 (Figure 1). All females were bled at d -21 prior to MGA feeding and d -11 before the administration of SMB, to determine estrus cyclicity. All blood was collected via jugular venipuncture using 18 g needles (3.75 cm long) and 20 cc syringes. Once blood was collected it was immediately put in an ice water bath until centrifugation at 2,000 x g for at least 10 minutes at 4°C (Wiseman et al., 1983). Serum was harvested and stored in 1.5 mL vials at -20°C until assayed for blood progesterone concentrations by a validated ELISA (Kesler et al., 1990). All females were administered SMB for estrus synchronization, the hydron implant was administered subcutaneously to the convex surface of the middle one-third of the ear. The injection of estradiol valerate (5.0 mg) and norgestomet (3.0 mg) was administered intramuscularly in the neck with an 18 g x 1.5 inch needle at the time of implantation. The implants were removed nine days after administration. Females were expected to be in estrus approximately 48 h after implant removal.

Cows were artificially inseminated (d=0) with commercial frozen semen approximately 48 h after norgestomet implant removal. Two inseminators were used to randomly inseminate all cows. At the time of AI, cows were also bled to determine estrus synchronization (Figure 1). Estrus synchronization was defined as cows of a herd showing a uniformly low level of progesterone prior to AI. On d +28 cows were randomly examined via transrectal ultrasonography by one of two veterinarians with a 7.5 MHZ linear array transducer to determine pregnancy (Pierson et al., 1988).

Cows with blood progesterone levels $1 ng/mL in either blood sample before AI were considered to be estrus-cycling, while cows with blood progesterone levels #1 ng/mL in both blood sample -11 d and -21 d before AI were considered anestrous. Estrus synchronization was defined as cows of a similar herd with progesterone levels below 1 ng/mL on the day of AI.

Estrus synchronization and pregnancy data were analyzed as a chi-square analysis as described by Cochran and Cox (1957) with animals fed MGA or not fed MGA, and estrous cycles as anestrous or estrus-cycling, as main effects.

RESULTS AND DISCUSSION

MGA used in conjunction with most other estrus synchronizing products synchronizes approximately 75% or less of a group of beef females (Patterson et al., 1989) and display a in
decrease in fertility rates (Patterson et al., 1989). The expected estrus synchronization rate of beef females with the use of SMB alone is approximately 85% (Kesler and Favero, 1996). Almost 15% of all beef females that do not synchronize are those in metestrous (d 1 to 4 of the estrous cycle). According to Fanning et al. (1992) and Pratt et al. (1991), 42 to 48% of females treated with SMB during metestrous were not synchronized. It was expected that the use of MGA just prior to SMB, would allow the females to pass out of metestrous prior to SMB treatment therefore synchronizing a larger percentage of the females. Of the 538 cows on study, 90.5% were estrus-cycling with 72.1% of these cows estrus-synchronized. Kesler and Favero (1996) and Kesler et al. (1997b) demonstrated similar studies of estrus synchronization using SMB with rates of 86% to 87%, respectively. With the use of MGA alone conception rates are low when cattle are inseminated at the first synchronized estrus (Patterson et al., 1989). Patterson et al. (1989) suggest the possibility of an extended interovulatory interval which results in a delayed ovulation of the preovulatory follicle due to the stage of the estrous cycle after MGA treatments. One-hundred eighty-two cows (36.7%) were determined pregnant at d +28 ultrasound with 75.8% of these cows estrus-cycling. The pregnancy rates were similar to a 40% average from 21 studies summarized by Kesler and Favero (1996).

When MGA was added to the diet of estrus-cycling cows, there was an increase in pregnancy rates compared to that of the estrus-cycling cows without the addition of MGA to the diet. Pregnancy rates were 38% and 40% respectively. The anestrous cows resulted in pregnancy rates of 31% without MGA and 30% with the addition of MGA. There were no significant differences in pregnancy rates between those cows fed MGA and those serving as control animals (Table 1), although there was a slight increase in fertility. Feeding of MGA prior to SMB treatment required no additional handling of the cows and increased estrus synchronization rates from 86.5% with no MGA to 93.9% with MGA for estrus-cycling cows (P=.02) (Table 1). Pregnancy rates obtained in this study of those cows fed MGA met the hypothesized values when the estrus-synchronization rates were taken into account. Likewise, if the percentage of cows fed MGA which were estrus-synchronized would have been greater, the pregnancy rates would most likely have increased past the significant level. Reasoning as to why the estrus-synchronization rates were only 93.9% as apposed to higher, could be due to many reasons. All cows need to consume MGA daily at a high enough level to be functional in assisting with SMB estrus-synchronization. It is possible that some cows did not approach the bunk feeder to receive the daily dose of MGA, and some cows may consume more MGA than accounted for leaving other cows with less MGA than required. With the 7.4% increase in estrus synchronization obtained in this study came a 2.7% increase in pregnancy rates. Even though this is not a significant increase in pregnancy it still has the potential of increasing the number of calves born each year by 2.7 calves per 100 cows. With MGA being relatively inexpensive, and the potential of calf value being greater, MGA feeding may be worth the small investment to feed for a short period prior to SMB treatment as long as pregnancy rates were increased also. Hypothetically, if an overall pregnancy rate of 55% was obtained in this study, the improvement in synchronization would have amplified pregnancy rates by 4%.
Figure 1. Treatments and schedule of treatments. All cows were bleed on d -21, -11, 0, +28. Half the females were fed MGA while all received SMB on d -11. All females were bred by AI on d 0 and examined for pregnancy via transrectal ultrasound on d +28.

Table 1. Beef cows administered MGA before Syncro-Mate B treatment

<table>
<thead>
<tr>
<th></th>
<th>No MGA</th>
<th>MGA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Synchronization Rate</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estrus-cycling Cows</td>
<td>154/178 (86.5%)</td>
<td>200/213 (93.9%)</td>
</tr>
<tr>
<td><strong>Pregnancy Rate</strong>:</td>
<td></td>
<td></td>
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<tr>
<td>Anestrous Cows</td>
<td>23/75 (30.7%)</td>
<td>19/64 (29.7%)</td>
</tr>
<tr>
<td>Estrus-cycling Cows</td>
<td>63/167 (37.7%)</td>
<td>77/191 (40.3%)</td>
</tr>
</tbody>
</table>

*Synchronized estrus-cycling cows include all animals from study.

*Numbers in parentheses are percentages of animals responding within that group.

*Pregnant anestrous cows and estrus-cycling cow numbers does not include those which lost their norgestomet implants from a concurrent study.

*x,y Values with different superscripts within rows differ (P=.02)

LITERATURE CITED


