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Abstract
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Keywords
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USE OF CYSTORELIN® AND ARTIFICIAL INSEMINATION IN REPEAT-BREEDING BEEF HEIFERS AFTER ESTROUS SYNCHRONIZATION[1]

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Summary

Gonadotropin-releasing hormone (GnRH) was administered to a group of 13- to 14-month-old Angus and Angus crossbred repeat-breeding heifers at the time of the second or third artificial insemination to determine its effect on conception rates. Little benefit was derived from the use of GnRH at either second or third service in highly developed repeat-breeding heifers.

(Key Words: Gonadotropin-Releasing Hormone, Repeat Breeders, Conception Rate, Beef Heifers.)

Introduction

GnRH is a naturally occurring hormone that is synthesized in an area of the brain called the hypothalamus and is a component of a complex series of hormonal interactions preceeding ovulation. As pulses of GnRH are released from the hypothalamus, it stimulates the pituitary gland to produce surge-like secretions of follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which are released into the bloodstream to act on the ovaries. The magnitude of the induced surge of LH is then sufficient to stimulate ovulation in cattle and sheep. Ovulation normally occurs 24 to 30 hours after the start of behavioral estrus. An injection of GnRH at the time of breeding (12 hours after first observed behavioral estrus) theoretically should result in a large surge of LH, resulting in ovulation and increased chances for conception.

Estrous synchronization programs at Kansas State University using melengestrol acetate (MGA) and prostaglandin $F_{2\alpha}$ have demonstrated 65% to 79% behavioral estrus by 6 days after prostaglandin administration. First-service conception rates have ranged from 58% to 81%. Clinical trials and on-ranch experience, however, show a marked decrease in second-service conception rates. The physiological reason is unknown.

Previous research with dairy cattle has demonstrated that GnRH administration results in up to 20% higher conception rates in repeat-breeders (more than two services). Little benefit was noted at first or second services. However, there is little information detailing conception rates following the use of GnRH at the time of service in second- or third-service beef heifers.

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[1]Authors sincerely appreciate the assistance of Sharon Tucker and Heartland Cattle Company in conducting this trial.

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Experimental Procedures

Five-hundred and eight 13- to 14-month-old Angus and Angus crossbred heifers were developed uniformly in a drylot heifer operation. Each heifer underwent a prebreeding evaluation consisting of reproductive tract scoring (1 = > 25mm horn diameter, 5 = < 10mm horn diameter), pelvimetry, and weight and frame score determinations. Any heifer determined unlikely to be cycling at the time of breeding was culled. Estrus was synchronized using a 14-day regimen of MGA fed at a level of 0.5 mg/head/d, followed 17 days later by the administration of an analog of prostaglandin $F_{2\alpha}$. All heifers were inseminated artificially 12 hours after first observed signs of estrus using a single unit of semen from either of four sires. Sires were selected on the basis of their genotypic and phenotypic characteristics and those of individual heifers. Heifers were observed twice daily for return to estrus following the initial insemination. Those heifers that returned to estrus were assigned randomly to either a control group, which received an intramuscular injection of 2 ml of sterile saline at the time of breeding, or a treatment group, which received an intramuscular injection of 100 µg of GnRH (Cystorelin®) in 2 ml of saline at the next estrus and insemination after the synchronized heat. This group of second-service heifers was again observed twice daily for signs of estrus. Of the heifers returning to estrus a third time, those in the control group for the second service were placed in the GnRH-treatment group for the third service. Those heifers in the treatment group for the second service were placed in the control group for the third service. All heifers were again inseminated 12 h after first detected estrus using a single unit of semen from a predetermined sire, and at the time of insemination, received either saline of Cystorelin. All pregnancies were confirmed using a B-mode, real-time, linear array, ultrasound system 45 days following the third breeding.

Results and Discussion

Following the first insemination at the synchronized heat, 396 of 508 heifers were pregnant, with a resulting pregnancy rate of 71.7%. Of the remaining 112 heifers that returned to estrus a second time, 58 received GnRH and 54 (control) received saline at the time of the second service. Only a slight difference was apparent in the conception rates between these two groups. Of those heifers receiving the GnRH, 76% became pregnant compared to 74% in the control group.

Of the 28 heifers that failed to conceive to either of the first two services, three did not return to estrus a third time and were removed from the program. Within the third-service, GnRH-treatment group, nine heifers (75%) became pregnant compared to seven heifers (54%) in the control group.

Our results for second-service beef heifers are consistent with previous studies on second service, repeat-breeding, dairy cattle; there was little benefit from GnRH. Although our 22% increase in conception rates in third-service beef heifers receiving GnRH seems to indicate a benefit, the results may be misleading because of the small number of third services. The heifers in our study were well-developed, which may have led to their high first-service conception rates. GnRH may prove to be of greater value in groups of lower producing, repeat-breeding heifers whose first-service conception rates are 50% or less.