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Reproductive performance of yearling beef heifers after estradiol benzoate and estrous synchronization

Abstract

Injectable estradiol (estradiol benzoate) was evaluated for its effect on the reproductive performance of yearling beef heifers whose estrous cycles were synchronized using the melengestrol acetate/prostaglandin F₂ $\hat{I}\pm$ (MG-2 A®/PG) system. Estradiol was injected 40 h after prostaglandin. Heifers were inseminated artificially (AI) 12 h after first observed heat during a 35-d AI period followed by 28 d of bull exposure. Estradiol had no effect on heat response or first-service pregnancy rate to AI during the synchronized period (5 d) and had no significant effect on overall AI pregnancy rate (35 d), cumulative pregnancy rate (63 d), or average calving date. In summary, estradiol benzoate had no effect on the reproductive efficiency of yearling beef heifers whose estrous cycles were synchronized with the MGA/PG system.

Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Heifer; Estrous synchronization; MGA; Prostaglandin; Estradiol benzoate

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REPRODUCTIVE PERFORMANCE OF YEARLING BEEF HEIFERS AFTER ESTRADIOL BENZOATE AND ESTROUS SYNCHRONIZATION¹

R. P. Bolze and C. W. Peters

Summary

Injectable estradiol (estradiol benzoate) was evaluated for its effect on the reproductive performance of yearling beef heifers whose estrous cycles were synchronized using the melengestrol acetate/prostaglandin F₂α (MGA®/PG) system. Estradiol was injected 40 h after prostaglandin. Heifers were inseminated artificially (AI) 12 h after first observed heat during a 35-d AI period followed by 28 d of bull exposure. Estradiol had no effect on heat response or first-service pregnancy rate to AI during the synchronized period (5 d) and had no significant effect on overall AI pregnancy rate (35 d), cumulative pregnancy rate (63 d), or average calving date. In summary, estradiol benzoate had no effect on the reproductive efficiency of yearling beef heifers whose estrous cycles were synchronized with the MGA/PG system.

(Key Words: Beef, Heifer, Estrous Synchronization, MGA, Prostaglandin, Estradiol Benzoate.)

Introduction

Estrous synchronization prior to artificial insemination (AI) can shorten breeding and calving seasons and increase calf weaning weights. Earlier experiments conducted by KSU animal scientists have shown that the MGA/PG estrous synchronization system is effective in increasing the number of heifers conceiving after AI. In some of the early PG synchronization research, West Virginia

researchers found that an injection of estradiol benzoate at 40 to 48 h after PG improved heat expression, conception rate after AI, and overall pregnancy rate in yearling beef heifers and lactating beef cows. Therefore, our objective was to evaluate the effect of combining injectable estradiol in an MGA/PG estrous synchronization system on heat response and pregnancy rate in yearling beef heifers.

Experimental Procedures

A total of 101 fall-born heifers from a central Kansas Simmental ranch received MGA (.5 mg per head/d) for 14 d, with PG (Bovilene®) injected intramuscularly 17 d after the last MGA feeding. At the time of PG injection, blood was collected for serum progesterone analysis. At 40 h after PG injection, heifers were allotted, based on age and weight, to receive one intramuscular injection of either 1) 2 ml of corn oil or 2) 2 ml of corn oil containing 400 µg of estradiol benzoate.

Heifers were inseminated 12 h after first detected estrus. A few heifers that showed estrus less than 40 h after PG injection were removed from the experiment. A second PG injection was given 10 d following the first PG injection to heifers that had not yet shown estrus. Artificial insemination 12 h after observed heat continued for 35 d, followed by 28 d of exposure to a single sire (63-d breeding season). Pregnancy was determined by palpation of the uterus 50 to 100 d after AI.

¹Appreciation is expressed to Dickinson Simmental Ranch, Gorham, KS for cooperating with this project.

First-service pregnancy rate was verified by actual calving dates.

Results and Discussion

Table 1 summarizes the effect of estradiol on the reproductive performance of fall-born yearling Simmental heifers whose estrous cycles were synchronized with the MGA/PG system. Only 79% of the heifers were puberal (serum progesterone > 1 ng/ml) at the start of the breeding season. Similar percentages of puberal heifers were in estradiol and control groups (78 vs 80%). Average

serum concentrations of progesterone (4.82 vs 6.14 ng/ml) were similar for control and estradiol-treated heifers, respectively. Estradiol benzoate had no effect on the percentage of heifers showing estrus or on first-service AI pregnancy rate, overall AI pregnancy rate, cumulative pregnancy rate, or average calving date.

In conclusion, injecting yearling beef heifers with 400 µg of estradiol benzoate 40 h after PG injection in an MGA/PG estrous synchronization system failed to further improve their reproductive performance.

Table 1. Effect of Estradiol Benzoate on Reproductive Performance of Yearling Simmental Heifers Estrous Synchronized with the MGA/PG System

Item	Control	EB ^a
No. of heifers	50	51
Puberty ^a	78% (39/50)	80% (41/51)
Avg progesterone, ng/ml	4.82	6.14
Heat response during synchronized period (5 d)	66% (33/50)	73% (37/51)
First-service pregnancy rate during synchronized period (5 d)	64% (21/33)	65% (24/37)
Overall AI pregnancy rate (35 d)	68% (34/50)	78% (40/51)
Cumulative pregnancy rate (63 d) ^b	78% (39/50)	88% (45/51)
Average calving date	Sept. 24	Sept. 25

^aEstradiol benzoate.

^bHeifers with serum concentrations of progesterone > 1 ng/ml at the time of PG injection.

^cIncludes heifers that were inseminated and bull-bred.