

COMPARISON OF ESTRADIOL-17 β AND ZEARALANOL ON RATE OF
GAIN IN STEERS ON PASTURE¹

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Summary

Sixty-three steers, averaging 170 kg and 180 days of age, were stratified by breed, weight and age and randomly assigned to three treatments with three replications. Treatment groups consisted of controls, zearalanol (Ralgro®) implanted and estradiol-17 β (Compudose®) implanted steers. Steers were implanted at the start of the trial with 36 mg zearalanol implants and estradiol-17 β silicone rubber controlled release implants designed to deliver 70 μ g/hd/day and were not reimplanted. The trial was conducted over a 196-day period on crested wheatgrass pastures. As nutrient content of the forage declined over the grazing season, barley and high quality hay was provided on the pastures to maintain adequate gains. Zearalanol and estradiol-17 β implants significantly increased gains ($P < .05$) over the control steers and were not different from each other. Daily gains were .59, .65 and .68 kg, respectively, for the controls, zearalanol implanted and estradiol-17 β implanted steers. Gains were identical for zearalanol and estradiol-17 β implanted steers for the first 168 days of the trial, with estradiol-17 β steers outgaining zearalanol steers the last 28 days ($P < .05$). Overall zearalanol increased gains 10% over controls and estradiol-17 β 15%. (Key Words: Implants, Zearalanol, Estradiol-17 β , Steers, Pasture.)

Introduction

Steers implanted with zearalanol (Ralgro®) have shown increased gains during the suckling, growing and finishing stages of growth (Thomas and Armitage, 1970; Sharp and Dyer, 1971; Nichols and Lesperance, 1973). Numerous studies have pointed out the necessity of reimplanting every 65 to 100 days when using zearalanol or other anabolic agents for maintaining improved rate of gain by steers (Thompson and Kercher, 1959; Melton and Riggs, 1965; Lofgreen, 1974). In many cases, producers cannot or will not gather their steers for reimplantation and hence, lose a portion of the potential benefit.

Turner, et al. (1981) and Parrott et al. (1979) found that estradiol-17 β (Compudose®) given as a single implant to steer calves, 10 to 80 days of age, improved gains over 456 and 499-day periods, respectively. With a long-lasting implant, the expensive and time-consuming task of gathering and handling steers for reimplantation could be eliminated.

The objective of this trial was to compare a single dose of estradiol-17 β to a single dose of zearalanol on rate of gain in growing steers on pasture for approximately 200 days.

Materials and Methods

Sixty-three fall born steers, averaging 170 kg, were stratified by breed, weight and age and randomly assigned to three treatments with three replications. Treatments consisted of a control group not receiving an implant, a group receiving zearalanol and a group receiving estradiol-17 β . Three different pastures (replications) were utilized at all times with the three treatments equally represented in each pasture. The trial was initiated on May 14 and terminated on November 26.

Steers were predominately Hereford X Angus, however, there were a few with 1/4 to 1/2 Simmental breeding. Calves were born in October and November and were the result of artificial insemination with a single sire representing each breed. Steers were approximately 180 days of age at the start of the trial. They were weaned one month prior to the trial, given appropriate vaccinations and put on feed in dry lot.

Animals were assigned to crested wheatgrass pastures and were moved to fresh pastures as feed availability became limiting. To maintain adequate gains, additional feed was provided on pasture as nutrient quality of the pasture declined with maturity of the plants. Barley (IFN 4-07-939) was provided at the rate of .45 kg per head per day starting on July 18 and increased to .90 kg on August 7 to termination. A combination of native meadow hay (IFN 1-03-181) and alfalfa hay (IFN 1-00-068) was also provided on pasture starting August 7. Water was hauled to the animals daily and available at all times along with salt and a 50% salt-50% bonemeal mix. Insecticidal dust bags were provided for fly control.

Cattle were weighed twice on consecutive days at the beginning and end of the experiment and at 29-day intervals throughout the study. All weights were taken after an overnight shrink off of feed and water. Steers were evaluated daily for buller steer behavior. Steers were also checked at the time of weighing for presence of the estradiol-17 β implant.

Both zearalanol and estradiol-17 β were administered one time only at the initiation of the trial. Zearalanol was administered subcutaneous in the median surface of the ear at a dosage level of 36 mg (3 pellets). Compudose 400, which is designed to deliver 70 μ g per head per day of estradiol-17 β , was placed subcutaneously in the posterior median surface of the ear using an implant needle with a base diameter sufficient to accommodate the implant. The implant is 4.76 mm in diameter and 3.0 cm long. The outer coating (500 microns thick) contains the estradiol-17 β , 20% by weight, embedded in silicone rubber (Dow Corning MDX-4-4210), 80% by weight. The implants were removed with a tool designed to immobilize the implant in a groove which contains a surgical cutting edge. Implant and steer numbers were recorded

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and implant weight losses measured. All implants were weighed individually prior to insertion and after removal. After removal the implants were washed in tap water, dried in an incubator at 37°C for 24 hours and allowed to equilibrate to room temperature and humidity for at least two hours prior to final weighing.

Analyses of variance and least significant differences were applied to the data to test for differences between treatments (Steel and Torrie, 1960).

Results and Discussion

Average daily gains of control steers and those receiving zearalanol and estradiol-17 β were .59, .65 and .68 kg, respectively (table 1). Zearalanol and estradiol-17 β implants increased daily gains of steers over the controls ($P < .05$) but were not significantly different from each other ($P > .05$). This represented a 10% increase in gain over control using zearalanol and 15% using estradiol-17 β . It is recommended that zearalanol be reimplanted every 65 to 100 days for maximum response, however, in this trial gain response to zearalanol and estradiol-17 β was identical through the first 168 days of the trial (table 2). Estradiol-17 β implanted steers gained significantly more than zearalanol implanted steers days 168 through 196. There was also a significantly better response to the implants by the heavier steers and particularly in the response to estradiol-17 β .

One estradiol-17 β implant was lost during the first 28 days, with this animal being reimplanted. All other implants remained in place for the duration of the trial. The mean difference between initial implant weight and removal was 12.6 mg. Over the 196-day trial this represents a mean delivery rate \pm the standard error of 64.3 \pm .77 μ g of estradiol-17 β per head per day. There was no buller activity observed on any of the steers.

In conclusion, zearalanol appeared to give an anabolic response throughout the 196-day trial period as did estradiol-17 β . However, the last 28-day period may have signaled the end of the zearalanol response whereas estradiol-17 β promoted a higher level of growth response at the end of the study. The silicone rubber controlled release estradiol-17 β implant compared favorably with zearalanol and provides the added advantage of eliminating the need for periodic reimplantation.

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TABLE 1. AVERAGE DAILY GAIN OF CONTROL STEERS RECEIVING ZEARALANOL AND ESTRADIOL-17 β IMPLANTS ON PASTURE (196 DAYS)

Treatment	No. ^a	Initial	ADG \pm S.E.	Increase
		weight		over control
		kg	kg	%
Control	20	172	.59 ^b \pm .01	-
Zearalanol	18	173	.65 ^c \pm .01	10
Estradiol-17 β	21	167	.68 ^c \pm .02	15

^a Four steers died of lead poisoning during the first few days of the trial due to prior ingestion of lead base paint from the dry lot fences.

^{b,c} Means in the same column bearing different superscripts differ ($P < .05$).