

Blood serum testosterone concentrations were quantified by a specific radioimmunoassay that had been previously validated in our laboratory.

Results and Discussion

Average blood serum testosterone was similar for heat stressed and control bulls throughout the treatment period ($3.76 \pm .26$ and $3.86 \pm .40$ ng/ml, respectively). Endocrine profiles for bulls on both treatments were similar over each 12-hr bleeding period. Figure 1 illustrates the variation in serum testosterone that occurred in a typical bull during a 12-hr sampling period. Both the frequency and magnitude of episodic releases of testosterone were not different between heat stressed and control bulls (Table 1).

Respiratory rates for heat stressed bulls were significantly greater than those for control bulls by day 6 of treatment and averaged 55.2 ± 2.1 and 44.6 ± 1.5 breath/minute, respectively, on day 15. Likewise, rectal temperatures were significantly increased during the experimental period and averaged $38.9 \pm .1$ C for heat stress compared to $38.6 \pm .1$ C for control bulls.

The results of this experiment indicate that exposure of bulls to elevated ambient temperature for 15 days does not appear to influence blood serum concentrations of testosterone. The absence of an effect of heat stress on serum testosterone concentrations suggests that either heat stress does not alter testicular androgen biosynthesis or adjustments in extragonadal metabolism or disposition of androgens occur so blood concentrations do not reflect testicular androgen synthesis.

Literature Cited

Meyerhoeffer, D. C., R. P. Wettemann, M. E. Wells and E. J. Turman. 1976. *J. Anim. Sci.* 43:331.

Influence of Growth Stimulants on Reproductive Performance of Heifers

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Story in Brief

Seventy-five Hereford heifers were used to determine the influence of zeranol on subsequent reproductive performance. Twenty-six heifers were implanted with 36 mg zeranol at 42 ± 2 days of age. Twenty-five heifers were similarly implanted and reimplanted three times at 100-day intervals. A third group of 24 control heifers were not implanted.

All heifers were maintained together and were exposed to fertile Angus bulls with chinball markers at about 450 days of age for 55 days and pregnancy rates were determined by rectal palpation between 70 and 120 days after breeding. Body weights were similar for all treatments at the start of the breeding period.

Percentage of animals exhibiting estrus was not influenced by treatment, however, pregnancy rates were greater ($P < .01$) for control and single implanted heifers compared to multiple implanted heifers. Forty-six percent of the control heifers and 50 percent of the single implanted heifers were pregnant after a 55-day breeding period compared to only 4 percent of the multiple implanted heifers.

This study indicates that multiple implantation with zeranol until 100 days before the start of the breeding season has a detrimental effect on pregnancy rate in heifers, whereas, a single implant prior to two months of age does not influence pregnancy rate.

Introduction

Zeranol is a synthetic estrogenic compound produced by deep tank fermentation of corn grain followed by a chemical synthesis process. When implanted, this exogenous source of estrogen causes increased gain and feed efficiency and may alter normal reproductive endocrine function.

Most growth stimulants are effective in heifers as well as steers. The decision as to whether a heifer will be maintained in the breeding herd is often not made until weaning or even until a year of age. Thus, some heifers that are implanted at an early age may be added to a breeding herd at some time in the future. There is limited information on reproductive functions of heifers that have been implanted with anabolic estrogens prior to one year of age.

The objective of this experiment was to determine the influence of limited and multiple implantation with zeranol on reproductive performance of heifers.

Materials and Methods

Seventy-five Hereford heifers were blocked by age and randomly assigned at 42 ± 2 days of age and 139 ± 7 lb body weight to treatments: control (no implant), single implant (36 mg zeranol at 42 days) and multiple implant (36 mg zeranol four times at 100-day intervals starting at 42 days).

Animals were born in the spring of 1977 and maintained on native range. The winter supplementation consisted of 5 lb of 20 percent natural protein range cubes daily. Snow covered the ground for 47 days during the winter and *ad libitum* grass hay was offered in addition to range cubes on those days. During the spring of 1978, heifers were supplemented with 5 lb of ground corn per day to increase gain after the severe winter in order to achieve adequate breeding size by 15 months of age.

Heifers were exposed to fertile Angus bulls equipped with chinball markers at about 450 days of age for 55 days and were checked daily for breeding activity. Pregnancy rates were determined by rectal palpation at 70 to 120 days after breeding.

Results and Discussion

Body weights (Table 1) were similar for all heifers when allotted to treatments. The body weights for the single implant heifers were significantly heavier than those of the control heifers at approximately four months of age. Weights for the multiple implant group were not significantly different from the control group at four months of age, but the multiple implant heifers were slightly heavier than the control group. Body weights were not significantly different at 8, 12 and 15 months of age, although both groups of implanted heifers tended to be heavier than the control heifers. The small differences in weights between treatments at these later periods could be attributed to the severe wintering conditions. Rate of gain was reduced for all heifers during the winter, at the age when rapid growth would be expected, thereby not allowing the effects of the implant on growth to be fully expressed.

Percentage of animals exhibiting estrus was not influenced by the treatments. However, pregnancy rates were greater for the control and limited implanted heifers ($P < .01$) than for the multiple implanted heifers (Table 1). The exogenous source of estrogenic compound (zeranol) in the multiple implant group probably inhibited ovarian function by blocking secretion of gonadotropic hormones from the pituitary gland.

These data indicate that multiple implantation with zeranol at 100-day intervals starting prior to two months of age until about 100 days before breeding has detrimental effects on pregnancy rate in heifers. However, a single implant prior to two months of age did not influence pregnancy rate.

Table 1. Characteristics of Hereford heifers implanted with a growth stimulant.

Characteristics	Treatment		
	Control	Single Implantation	Multiple Implantation
Number of heifers	24	26	25
Age at 1st implantation (da)	40	45	43
Weight at 1st implantation (lb)	140± 7 ^a	142± 6	135± 5
Weight at 4 months (lb)	259± 11 ^b	273± 9 ^c	264± 9
Weight at 8 months (lb)	346± 11	366± 11	361± 11
Weight at 12 months (lb)	381± 12	391± 11	398± 11
Age at start of breeding (da)	442± 4	447± 3	444± 3
Weight at start of breeding (lb)	490± 13	500± 11	523± 12
Weight at end of breeding (lb)	583± 15	595± 12	608± 13
Exhibited estrus (%)	54	65	60
Pregnancy rate (%)	46 ^d	50 ^d	4 ^e

^aMean ± standard error.

^{b,c}Values with different superscripts differ significantly ($P < .025$).

^{d,e}Values with different superscripts differ significantly ($P < .01$).