

Research Project  
Department of Animal Science  
College of Agricultural Sciences  
Texas Tech University

**TITLE:** Improvement of Feedlot Performance of Beef Heifers

**STATEMENT OF OBJECTIVES:**

To determine the influence of testosterone injections on feedlot performance, endocrine response, carcass characteristics, maintenance of pregnancy and occurrence of riding in feedlot heifers.

**PRINCIPAL INVESTIGATOR AND CO-WORKERS:**

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**DEPARTMENT:** Animal Science

**COOPERATING AGENCIES:**

Texas Cattle Feeders Association

Amarillo, Texas

## PROCEDURE:

Forty open and 20 pregnant heifers were randomly assigned by initial weight and pregnancy to 12 pens. Heifers in Treatment A received 500 mg testosterone (T) in a single injection, im, and heifers in Treatments B and C received two and five injections, respectively, containing 500 mg T each one week apart while heifers in Treatment D served as controls and received no testosterone. Heifers were weighed every 28 days and blood samples were collected by jugular puncture on the first four weigh days and the final weigh day. Blood samples were collected from pregnancy heifers during the first 56 days only. Daily feed consumption was recorded. Due to the extended withdrawal period required by FDA, the heifers were fed a high roughage ration for the first 130 days. The ration consisted of four pounds concentrate per head daily plus pelleted cotton burrs ad libitum. The remaining 83-day period the open heifers received a conventional finishing ration during the remaining 83-day period. Open heifers were slaughtered at the end of the feeding period. Pregnant heifers were allowed to complete gestation and were sold as pairs. Carcass measurements were taken and ovaries were collected and weighed following slaughter. Blood samples were analyzed by radioimmunoassay for estradiol and testosterone levels.

## RESULTS:

Feedlot performance of the open heifers receiving different levels of testosterone is presented in table 1. Due to the small number of observations in the study differences in feedlot performance were not significant. No explanation is available for the poor overall performance of the control heifers. Rate of gain and feed conversion were somewhat improved in heifers receiving T at all levels.

TABLE 1. Feedlot performance of heifers receiving different levels of testosterone

Item	Treatment			
	Control	500 mgT	1000 mgT	2500 mgT
No. of Heifers	10	10	10	10
Ave. Daily Gain, lb.	1.42	1.85	1.84	1.82
Ave. Daily Feed, lb.	18.5	21.6	21.3	19.2
Feed/Gain	13.1	11.7	11.6	10.2

Performance of pregnant heifers was not altered by T injection primarily since abortion was not induced in any females receiving T. All offspring appeared normal in all respects. Calving problems were not associated with treatments.

Estrous activity and the occurrence of riding among open heifers was not affected significantly by T injections.

Carcass grade and yield were not different between heifers receiving T and control heifers.

#### Hormone Analyses

Means of circulating levels of estradiol (E) are shown in the following table by period. No significant differences in estradiol levels or in changes of level by time were detected. The variation which did appear at random was most probably due to estradiol levels associated with estrus. Ovarian structure determined at slaughter was not significantly influenced by T injection. Estrous cycles were normal throughout the study regardless of treatment or period.

Table 2. Circulating estradiol levels<sup>a</sup> in heifers receiving testosterone injections

Treatment	Period			
	Second	Third	Fourth	Final <sup>b</sup>
Control	11.4	24.1	58.4	22.2
500 mg T	15.2	13.2	23.7	18.9
1000 mg T	15.6	11.9	19.9	18.2
2500 mg T	13.4	9.3	15.7	12.6

<sup>a</sup>Levels are reported in picograms estradiol per ml plasma.

<sup>b</sup>Final blood sample was collected 185 days following the final T injection in heifers on highest level.

Testosterone levels are presented in table 3. A highly significant change in circulating testosterone level was detected in direct relation to treatment level. This response was not altogether unexpected; however, the continuation of the response was much greater than was expected. The fourth blood sample was collected about 40 days following the final injection received by heifers on the highest level and the final blood sample was collected at least 6 months following the final injection. Whether these levels do, in fact, represent the differences in rate of gain and feed efficiency is not clear from these data. It does not seem likely that the release of tissue stores of testosterone could account for the elevated circulatory levels of testosterone for the period reported. An alteration in steroid metabolism and/or synthesis may have been induced by the higher levels of testosterone therapy. A 20 percentage change in rate of gain would tend to indicate some physiological change. However, a more extensive investigation of this response must be undertaken before a sound conclusion can be reached.

The withdrawal period granted by FDA (180 days) certainly seemed to be ample at the beginning of the study. In view of these results a longer

Table 3. Circulating testosterone levels<sup>a</sup> in heifers receiving testosterone injections

Treatment	Period			
	Second	Third	Fourth	Final
Control	27.9 <sup>ce</sup>	23.8 <sup>ce</sup>	31.9 <sup>ce</sup>	88.6 <sup>de</sup>
500 mg T	138. <sup>cf</sup>	311. <sup>df</sup>	136. <sup>cf</sup>	126. <sup>ce</sup>
1000 mg T	313. <sup>cf</sup>	380. <sup>cf</sup>	234. <sup>cf</sup>	847. <sup>df</sup>
2500 mg T	802. <sup>cg</sup>	921. <sup>cg</sup>	907. <sup>cg</sup>	1,274. <sup>dg</sup>

<sup>a</sup>Levels are reported in picograms T per ml plasma.

<sup>b</sup>Final blood samples was collected 185 days following the final T injection in heifers on highest level.

<sup>cd</sup>Mean in the same line not bearing a common superscript are different (P<.01).

<sup>efg</sup>Means in the column not bearing a common superscript are different (P<.01).

withdrawal period would be necessary if testosterone levels were to be returned to normal. Ruling of that type does not provide any allowance for a modification in the steroid secretion pattern which would prevent the normal level from being reached over a longer period of time. This fact in itself points out the falacy of standards for residue tolerance as accepted by FDA.