FORAGE AND LIVESTOCK RESEARCH - 1986

RESEARCH CENTER TECHNICAL REPORT 86-1

Texas A&M University Agricultural Research
and Extension Center at Overton

Texas Agricultural Experiment Station
Texas Agricultural Extension Service

Overton, Texas

April 24, 1986

INFLUENCE OF ZERANOL IMPLANT ON SIMMENTAL CROSSBRED BULLS

R. W. Godfrey, R. D. Randel and F. M. Rouquette, Jr.

SUMMARY

Twenty-four 1/2 Simmental x 1/4 Brahman x 1/4 Hereford bulls were used to study the effect of zeranol (Ralgro) on pre-puberal bulls. Pre-weaning, 12 bulls were implanted and 12 bulls were non-implanted. At weaning, 6 implanted and 6 non-implanted bulls were placed in both drylot and rye-ryegrass pastures. Weight gain was not affected by implant; however, drylot bulls gained nearly twice as much as pasture bulls. In both drylot and pasture, 83% of the non-implanted bulls reached puberty; whereas, only 33% in drylot and 17% on pasture reached puberty in the implanted bulls. Luteinizing hormone was increased and testosterone was decreased in response to gonadotropin releasing hormone in those bulls which were implanted. Zeranol also reduced scrotal circumference and testis weight.

OBJECTIVES

The primary objective of this trial was to evaluate the effect of Ralgro implant (zeranol) on luteinizing hormone, testosterone, scrotal circumference, testes weight and puberty in young bulls.

PROCEDURES

Twenty-four spring born 1/2 Simmental x 1/4 Brahman x 1/4 Hereford bull calves were allocated into either an implant group or non-implant group. Twelve of the bulls were implanted with 36 mg zeranol (Ralgro) at an average age of 162 days (pre-weaning) and 12 bulls were not implanted. Bulls assigned to the implant group were re-implanted at approximately 90-day intervals. At weaning, 6 bulls from the implant group and 6 bulls from the non-implant group were placed in dry lot and fed whole shelled corn plus a protein premix containing monensin. The other 12 bulls, 6 implanted and 6 non-implanted, were assigned to rye-ryegrass pastures. Bulls assigned to winter pasture were weighed throughout the trial and scrotal circumference and puberty measurements were recorded at the termination of the 9-month trial period. Bulls assigned to dry lot

were weighed and scrotal circumference and puberty measurements made at 28-day intervals. A bull was considered to be puberal when an ejaculate was produced which contained 50 x 10^6 sperm cells. All semen was collected by electroejaculation. Drylot bulls were also given an injection (I.M.) of 200 ug of gonadotropin releasing hormone (GnRH) and blood was collected via tail vessel puncture at 0, 1, 2, 3, 4, and 5 hours post-injection. Blood serum was harvested and analyzed for luteinizing hormone (LH) and testosterone (T) concentrations by radioimmunoassay. Bulls were slaughtered at termination of the trial and paired testes weight was measured for all bulls.

RESULTS

Bulls were approximately 200 days of age at initiation of the drylot and winter pasture phase and weighed approximately 550 lbs. The weight gain of implant and non-implant bulls was similar in either drylot or on pasture (Table 1). Both sets of drylot bulls gained nearly twice that of the pasture bulls. More than 80% (5 of 6) bulls reached puberty in the non-implanted groups in both drylot and pasture; whereas, in the implanted group, only 33% (2 of 6) in drylot and 17% (1 of 6) on pasture reached puberty. The first sperm cells were detected in non-implanted drylot bulls after only 72 days on trial (Table 3). The delayed time of puberty of implant bulls may be beneficial to the feedlot industry. If bulls are implanted while in the feedlot there may be a decrease in aggressive behavior between bulls, which could allow an increase in feed efficiency and gain. By delaying sperm production in implanted bulls it may allow the producer to keep bulls and heifers together for longer times without running the risk of having the heifers bred. Table 4 shows the mean age, body weight and scrotal circumference at puberty of bulls in drylot. There were no significant differences for these physical traits among those bulls that reached puberty under drylot conditions.

Luteinizing hormone (LH) concentrations in implanted bulls showed greater peak heights in response to gonadotropin releasing hormone (GnRH) than did the non-implanted bulls (Table 5). Serum testosterone concentrations were lowered by the zeranol implant (Table 6). The low testosterone level is the most likely explanation for the elevation of LH in implanted bulls as compared to non-implanted bulls. The serum

hormone patterns observed in the implanted bulls are similar to those of steers in relationship to the non-implant bulls. Scrotal circumference was reduced due to the zeranol implant (Table 7). Figure 1 shows the wide differences in rate of scrotal development throughout the 9-month trial period. The magnitude of implant effect on testis development was observed at time of slaughter (Table 8). Non-implanted bulls had testes 2 times as large as implanted bulls in drylot and 2 1/2 times as large under pasture conditions. In addition to these measured responses, there was a marked difference in behavior of the implanted vs non-implanted bulls with the implanted bulls being more docile in action and more steer-like in appearance.

TABLE 1. WEIGHT GAIN OF BULLS DURING TRIAL

Treatment	Body Weight Gain[a] (lbs) Drylot	Pasture
Non-Implanted	698 ± 35[b]	421 ± 26[b]
Implanted	706 ± 61[b]	386 ± 24[b]

[a]Mean ± SEM

[b]Values within a column with similar superscripts are similar (P>.10).

TABLE 2. PROPORTION OF IMPLANTED AND NON-IMPLANTED BULLS REACHING PUBERTY

Treatment	PUBERAL Drylot (%)	Drylot (n)	Pasture (%)	Pasture (n)
Non-Implanted	83.3[b]	5	83.3[d]	5
Implanted	33.3[c]	2	16.7[e]	1

[a]50×10^6 sperm/ejaculate.

[b,c]Values within a column with different superscripts are different (P<.08).

[d,e]Values within a column with different superscripts are different (P<.02).

TABLE 3. TIME REQUIRED TO DETECT FIRST SPERM CELLS IN DRYLOT BULLS

Treatment	Days After Trial Initiation
Non-Implanted	72[a]
Implanted	213[b]

[a,b]Values with different superscripts are different (P<.001).

TABLE 4. AGE, BODY WEIGHT (BW) AND SCROTAL CIRCUMFERENCE (SC) AT PUBERTY (P) OF BULLS IN DRYLOT

Treatment	n	Age at P[a] (d)	BW at P[a] (lbs)	SC at P[a] (cm)
Non-Implanted	5	345.0 ± 33.5[b]	937 ± 116[b]	31.1 ± .8[b]
Implanted	2	422.5 ± 20.5[b]	1134 ± 30[b]	28.5 ± .5[b]

[a]Mean ± SEM.

[b]Values within a column with the same superscripts are not different (P>.10).

TABLE 5. SERUM LUTEINIZING HORMONE (LH) CONCENTRATIONS IN BULLS IN RESPONSE TO GONADOTROPIN RELEASING HORMONE

Treatment	LH Peak Height[a] (ng/ml)	Time to LH Peak[a] (h)	Area Under LH Curve[a] (ng/ml X h)
Non-Implanted	9.5 ± .9[b]	1.2 ± .1[d]	22.2 ± 2.0[e]
Implanted	12.3 ± .7[c]	1.2 ± .1[d]	29.9 ± 3.1[f]

[a]Mean ± SEM.

[b,c]Values within a column with different superscripts are different (P<.02).

[d]Values within a column with the same superscripts are similar (P>.10).

[e,f]Values within a column with different superscripts are different P<.004).

TABLE 6. SERUM TESTOSTERONE (T) CONCENTRATIONS IN BULLS IN RESPONSE TO GONADOTROPIN RELEASING HORMONE (GnRH)

Treatment	T Peak Height[a] (ng/ml)	Time to T Peak[a] (h)	Area Under T Curve[a] (ng/ml X h)
Non-Implanted	4.3 ± .8[b]	2.7 ± .2[d]	16.5 ± 2.9[e]
Implanted	3.1 ± .7[c]	2.9 ± .2[d]	11.3 ± 2.6[f]

[a]Mean ± SEM.

[b,c]Values within a column with different superscripts are different (P<.005).

[d]Values within a column with the same superscripts are similar (P>.10).

[e,f]Values within a column with different superscripts are different (P<.001).

TABLE 7. AVERAGE SCROTAL CIRCUMFERENCE (SC) OF BULLS THROUGHOUT THE ENTIRE STUDY PERIOD

Treatment	SC[a] (cm)
Non-Implanted	29.3 ± 1.6[b]
Implanted	21.9 ± 1.0[c]

[a]Mean ± SEM.

[b,c]Values with different superscripts are different (P<.001).

TABLE 8. PAIRED TESTIS WEIGHT OF BULLS AT SLAUGHTER

Treatment	Drylot (g)	Pasture (g)
Non-Implanted	580.3 ± 93.6[b]	462.4 ± 52.8[d]
Implanted	291.6 ± 22.5[c]	187.4 ± 49.6[e]

[a]Mean ± SEM.

[b,c]Values within a column with different superscripts are different (P<.02).

[d,e]Values within a column with different superscripts are different (P<.001).

Mention of trademark or a proprietary product does not constitute a guarantee or a warranty of the product by the Texas Agricultural Experiment Station or Texas Agricultural Extension Service and does not imply its approval to the exclusion of other products that also may be suitable.

FIGURE 1. SCROTAL CIRCUMFERENCE (SC) OF NON-IMPLANTED, CONTROL (C) AND ZERANOL (Z) IMPLANTED BULLS OVER TIME