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Effects of Trenbolone Acetate¹ and Zeranol Implants on Performance, Carcass, and Meat Traits of Young Bulls and Steers

R.D. Johnson and M.E. Dikeman

Summary

Implanting young bulls and steers with trenbolone acetate and zeranol (Ralgro®) resulted in increased slaughter weights and carcasses that tended to have more marbling than those of control bulls. Furthermore, steaks from both implanted bulls and implanted steers tended to have less detectable connective tissue. Control bulls had larger scrotal circumferences and heavier testicle weights than implanted bulls. Other secondary sex characteristics were not affected, but in these bulls slaughtered at an average age of 13.6 months, sexual development was minimal. Implanting steers with trenbolone acetate and zeranol resulted in performance and carcass and meat quality slightly superior to control bulls.

Introduction

Natural or synthetic estrogen or testosterone sources used to improve performance and efficiency in steers have also been used in bulls to overcome some of the drawbacks of feeding intact males, including aggressive behavior; dark, coarsely textured lean; excess masculinity; reduced marbling and quality grade; and decreased palatability. Implanting young, prepubertal bulls with trenbolone acetate and zeranol followed by reimplantation with zeranol after puberty may improve carcass and meat traits over nonimplanted bulls, while attaining sensory-panel ratings similar to those of implanted steers.

Experimental Procedures

Twenty Polled Hereford bulls from the Kansas State University Cow-Calf Unit with an average frame score of 3.6 were randomly assigned to one of three treatments shortly after birth. Five calves remained as nonimplanted controls (CB). Nine were implanted with 140 mg of trenbolone acetate (TBA) and 36 mg of zeranol at about 1 mo. and reimplanted with both compounds 10 wk later. When these nine calves were 21 wk of age, the TBA implant was removed by scalpel. These bulls (IB) were reimplanted with zeranol alone every 10 wk until slaughter. The remaining six calves (IS) were castrated at about 3 wk of age and implanted with TBA and zeranol every 10 wk until slaughter. The calves were weaned at 7 mo. of age. After weaning, the calves were brought to the Kansas State University Beef Research Unit and fed a standard finishing diet until slaughter. Scrotal circumference was measured at 8 and 13 mo. Hip height and masculinity were evaluated at 12 and 13 mo., respectively. The cattle were slaughtered at an

¹Trenbolone acetate is a synthetic testosterone. It is currently being evaluated by the Food and Drug Administration as a commercial implant.

average age of 13.6 mo. Testicle weights were taken at slaughter, and carcass masculinity (size of jump muscle, crest, and pizzle eye), along with USDA yield and quality grades, were determined 24 hr postmortem. The wholesale rib was removed at 24 hr postmortem and aged in a cooler for 7 d. Two 1-inch steaks were removed (12th rib region) from each rib and stored frozen (-20 C). Both steaks were thawed and cooked; a trained sensory panel evaluated one steak, whereas Warner-Bratzler shear force was measured on the other.

Results and Discussion

At 13 mo. of age, the IS tended ($P=.07$) to be less masculine than either bull group. Scrotal circumferences were lower ($P<.05$) for IB than for CB at both 8 and 13 mo. (Table 8.1). The IB and IS groups tended ($P=.07$) to have higher slaughter weights. There were no differences among treatments for feed efficiency or average daily gain (Table 8.2). Hot carcass weights, dressing percentages, carcass maturity scores, and marbling scores were similar among treatment groups. The IS tended to have more fat thickness, smaller ribeyes, and higher yield grades than CB, but these differences were not statistically significant. Also, CB had heavier ($P<.05$) testicles than IB (Table 8.3). There were no differences among treatment groups for lean firmness, lean texture, lean color, or the presence of heat ring (Table 8.4). A trained sensory panel found no significant differences in flavor intensity, juiciness, overall tenderness, or myofibrillar tenderness, and Warner-Bratzler shear values did not differ between steaks from the three treatments. However, the IB and IS groups tended ($P=.14$) to have less connective tissue than CB (Table 8.5).

Implanting young bulls near birth with TBA plus zeranol and then zeranol alone after about 5 mo. of age reduced ($P<.05$) scrotal circumferences and tended ($P=.14$) to produce ribeye steaks with less connective tissue than steaks from CB. For small-framed cattle such as were used in this trial, the implanting scheme of trenbolone acetate and zeranol early in life and then zeranol alone later may counteract some of the problems associated with feeding bulls for meat production. This scheme may optimize the performance advantages and improve carcass and meat traits of bulls. Additionally, the steers seemed to perform exceptionally well with the combination of TBA plus zeranol from near birth until slaughter.

Table 8.1. Hip Height and Masculinity Characteristics for Control Bulls and Implanted Bulls and Steers

Item	Control Bulls	Implanted Bulls	Implanted Steers
Hip Height at 12 Mo., in.	47.7	46.6	44.9
Masculinity Score at 13 mo.	3.2 ^c	3.0 ^c	2.3 ^d
Scrotal Circumference at 8 mo., cm.	25.9 ^a	20.9 ^b	--
Scrotal Circumference at 13 mo., cm.	38.8 ^a	34.5 ^b	--

¹ Scores of 1 to 5: 2=slightly masculine, 3=moderately masculine, 4=masculine.

^{ab} Means in the same row with different superscript letters differ ($P<.05$).

^{cd} Means in the same row with different superscript letters differ ($P<.10$).

Table 8.2. Performance of Control Bulls and Implanted Bulls and Steers

Item	Control Bulls	Implanted Bulls	Implanted Steers
Weaning Wt., lb.	453	481	471
Slaughter Wt., lb.	1055 ^a	1139 ^b	1134 ^b
Average Daily Gain, lb.	3.1	3.4	3.5
Feed/Gain (DM basis)	5.2	5.4	5.2

^{ab} Means in the same row with different superscript letters differ ($P < .07$).

Table 8.3. Carcass Characteristics of Control Bulls and Implanted Bulls and Steers

Item	Control Bulls	Implanted Bulls	Implanted steers
No. of animals	5	9	6
Hot carcass wt., lb	641	685	675
Dressing percent	60.7	60.1	59.5
Carcass maturity	A ⁵⁵	A ⁵³	A ⁵²
Marbling score	Slight ⁸²	Small ⁰⁰	Small ⁰⁷
Fat thickness, in.	.34	.41	.46
Ribeye area, in ²	13.2	12.9	12.6
Ribeye area, in ² /cwt.	2.07	1.89	1.89
Yield grade	1.9	2.3	2.5
Testicular wt., gram	398 ^a	294 ^b	--
Jump muscle and crest score ¹	1.5	1.6	1.3

¹ Scores of 1 to 6: 2=barely evident, 3=slightly prominent, 4=moderately prominent.

^{ab} Means in the same row with different superscript letters differ ($P < .05$).

Table 8.4. Ribeye (Longissimus) Quality Characteristics for Control Bulls and Implanted Bulls and Steers

Item	Control Bulls	Implanted Bulls	Implanted Steers
Lean Firmness ¹	5.9	5.8	6.4
Lean Texture ²	4.3	4.9	5.6
Lean Color ³	4.3	4.1	4.0
Heat Ring ⁴ (dark coarse band)	1.0	1.0	1.1

¹Scores of 1 to 8: 5=slightly firm, 7=firm.

²Scores of 1 to 8: 4=slightly coarse, 5=slightly fine.

³Scores of 1 to 9: 3=light cherry red, 4=cherry red.

⁴Scores of 1 to 5: 1=none, 2=slight.

Table 8.5. Taste Panel Evaluation and Warner-Bratzler Shear Values of the Ribeye (Longissimus) for Control Bulls and Implanted Bulls and Steers

Item	Control Bulls	Implanted Bulls	Implanted Steers
Flavor Intensity ¹	6.1	6.3	6.3
Juiciness ¹	6.1	6.3	6.4
Connective Tissue Amount ²	6.7	7.1	7.2
Myofibrillar Tenderness ³	5.4	6.2	6.4
Overall Tenderness ³	5.8	6.4	6.5
Warner-Bratzler Shear, kg.	4.0	3.4	3.3

¹6=Slightly intense or slightly juicy 7=very intense or very juicy.

²6=Slightly amount, 7=practically none.

³Scores of 1 to 8: 5=slightly tender, 6=moderately tender.