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BEEF REPORT

EFFECTS OF ANABOLIC IMPLANTS ON REPRODUCTIVE FUNCTION, CARCASS CHARACTERISTICS AND PERFORMANCE IN POSTWEANED BEEF BULLS

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Summary

Angus bulls averaging 620 lb were used to study the effects of implants on performance, carcass characteristics and reproductive parameters of intact males. Sixty-six bulls were randomly assigned to four treatments. These treatments were (1) nonimplanted, (2) implanted with 36 mg of Ralgro every 60 to 70 days, (3) implanted with 220 mg of Synovex-S every 60 to 70 days, (4) implanted with 24 mg of Compudose every 180 days. Body weights were taken at the initiation of the trial and every 28 days. Blood samples were collected via jugular venipuncture weekly for 9 weeks and then monthly for 4 months with the final sample taken at slaughter. Blood was evaluated for testosterone, luteinizing hormone and growth hormone levels. Bulls were on test 217 days. Final average weight and hip height were 1142 lb and 49.6 in., respectively. Nonimplanted bulls had the largest final scrotal circumference of 39.6 cm compared to 38.8 cm for Ralgro-, 38.6 cm for Compudose- and 37.8 cm for Synovex-implanted bulls. Implanting postweaning had little effect on average daily gain, hip height, testicular weight, testosterone, luteinizing hormone levels and sperm chromatin structure. Synovex implanted bulls had the highest growth hormone levels. Compudose- and Synovex-implanted bulls had the heaviest ($P<.01$) carcass weights and dressing percentage. Also, the Synovex-implanted bulls had the greatest ($P<.01$) fat thickness at the 12th rib and least desirable yield grade. No difference was present for longissimus muscle, and KPH fat.

(Key Words: Implants, Bulls, Performance, Carcass, Hormones.)

Introduction

The cattle production option of feeding young bulls for meat is utilized on a very limited basis in the United States. Bull beef production is the major system of beef production in Europe. Young bulls grow faster and are more efficient red meat producers than steers. However, bulls are not popular in feedlots due to increased management problems resulting from more aggressive behavior.

Bulls yield 5.5% more boxed beef and cut 17% less fat trim than steers. Yet, bullock carcasses frequently have lower quality grades than steers. Tenderness ratings are generally lower for bulls than steers of the same age.

Implanting inhibits testicular growth when administered to prepubertal bulls. Implanting bulls of older ages appears to have little effect on scrotal circumference or testicle weight. Little work has been done on semen quality. However, implantation preweaning has a detrimental effect on testicular development.

Experimental Procedure

After weaning, 66 Angus bull calves were transported to the Southeast Experiment Station, Beresford, South Dakota, where they remained on test 217 days. They were randomly allotted to four treatments, (1) nonimplanted, (2) Ralgro, (3) Synovex-S and (4) Compudose, and divided into pens with eight or nine animals per pen.

The implanted bulls were reimplanted every 60 to 70 days for Ralgro and Synovex and every 180 days for Compudose. Cattle were started on an ad libitum diet of 45% corn and 55% alfalfa hay. The ration was increased progressively to a final ration of 73% corn, 22% corn silage and 5% mineral supplement for the last 120 days of the trial. Individual weights were recorded at 28-day intervals. Hip height, measured in centimeters at the hip, and scrotal circumference, measured with a metal tape, were taken for all individuals at the initiation and termination of the trial. Blood samples were collected weekly for 9 weeks and then monthly for 3 months, with the final collection just prior to slaughter. Blood was centrifuged and frozen at -24 C until hormone analysis. Later the serum was assayed for testosterone, growth hormone and luteinizing hormone by radioimmunoassay.

On July 15, 1985, one pen per treatment was transported to a commercial packing plant. The remaining bulls were slaughtered July 22, 1985. To avoid preslaughter stress, all bulls were slaughtered immediately upon arrival at the plant. The vas deferens were removed from testes at the slaughter plant and sperm stripped from the vas deferens to be measured by flow cytometry. After slaughter, hot carcass weights were recorded and testes were removed. The testes were placed on ice and transported back to the laboratory where testes weights were recorded. Carcass data were obtained 24 hours postmortem with the assistance of a USDA grader. Marbling, maturity score, final quality grade, adjusted fat thickness and kidney, heart and pelvic fat were recorded. The longissimus dorsi muscle was traced at the 12th rib for each carcass and later the area was determined by a compensating polar planimeter.

Results and Discussion

Implanting bulls after weaning had little effect on performance traits (table 1). All groups had similar initial weight, final weight, weight gain and average daily gain. Anabolic agents had little effect on hip height. Skeletal growth measured by hip height was similar in all groups.

Testicular parameters are included in table 1. There was no difference in scrotal circumference gain during the trial. However, final scrotal circumference was less ($P>.05$) for Synovex implanted bulls than controls but not different than the other implanted groups. Control bulls had the largest numerical final scrotal circumference size and scrotal circumference gain during the trial. Considerable numeric difference was present in testicular weight but was not statistically significant. Similar to scrotal circumference, control bulls had the higher testicular weight and Synovex-implanted bulls the lowest. Implanting had little effect on testicular weight in bulls implanted after weaning.

Means for carcass data are presented in table 2. Carcass weights for Compudose- and Synovex-implanted bulls were heavier ($P>.05$) than Ralgro and control bulls. Longissimus muscle area, kidney, pelvic and heart fat and

marbling were similar among treatments. Fat thickness measured at the 12th rib was greater (P>.05) for Synovex than the other three groups. The greater fat thickness in the implanted bulls increased the USDA yield grade to 2.8 compared to control bulls (2.4), Compudose- (2.4) and Ralgro- (2.4) implanted bulls. Compudose- and Synovex-implanted bulls had the highest (P<.05) dressing percentage (63.2 and 62.6%, respectively) compared to Ralgro (61.7%) and control (61.0%).

There was little difference in serum chromatin structure measured by flow cytometry between the four treatments. Considerable variation in sperm cells was present within treatment groups. Postweaning implanting with anabolic agents had little effect on sperm parameters measured.

There was no difference due to any of the implants for testosterone or luteinizing hormone levels. Mean testosterone levels during the trial were 8.9, 8.6, 8.3 and 7.4 ng/ml for Ralgro, Compudose, Synovex and control groups, respectively. During the duration of the experiment, all groups had similar testosterone levels during each collection period. Average luteinizing hormone levels during the trial were .14, .13, .11 and .11 ng/ml for Synovex, control, Ralgro and Compudose, respectively. There was no difference in luteinizing hormone levels (P>.05) between the four groups.

All three implants resulted in increased growth hormone levels compared to controls. However, the only significant increase (P<.05) in growth hormone occurred in the Synovex group compared to controls. Mean growth hormone levels for Synovex, Ralgro, Compudose and control groups during the trial were 54.8, 46.8, 44.6 and 32.0 mg/ml, respectively.

Results of this study indicate implanting bulls after weaning has little effect on performance, testicular weight, longissimus dorsi muscle area, kidney, pelvic and heart fat, marbling and sperm chromatin structure but did effect scrotal circumference, fat thickness, dressing percentage, USDA quality grade, carcass weights and GH levels. From these data there are minimal effects of implanting bulls after weaning on reproductive function, performance or hormone levels.

TABLE 1. LEAST-SQUARES MEANS FOR PERFORMANCE, HIP HEIGHT AND TESTICULAR PARAMETERS

Item	No. of observ-vations	Control	Ralgro[a]	Synovex[a]	Compudose[b]
Initial wt., kg	66	280 ± 5.4	274 ± 2.2	282 ± 5.2	289 ± 5.4
Final wt., kg	64	521 ± 9.9	497 ± 9.3	531 ± 9.3	524 ± 9.9
Avg daily gain, kg/day	64	1.11 ± .04	1.03 ± .04	1.14 ± .04	1.08 ± .04
Hip height, cm					
Initial	66	110.8 ± 1.08	109.7 ± 1.05	112.1 ± 1.05	112.6 ± 1.08
Final	64	126.8 ± .79	124.1 ± .79	126.4 ± .74	126.6 ± .79
Gain[c]	64	15.7 ± 1.00	14.4 ± .97	14.3 ± .97	13.7 ± 1.00
Scrotal circumferemce, cm					
Initial	66	25.8 ± .60	25.8 ± .59	26.1 ± .59	27.6 ± .60
Final*	64	39.6[e] ± .44	38.8[ef] ± .41	37.8[f] ± .41	38.6[ef] ± .44
Gain[d]	64	13.5 ± .76	13.0 ± .72	11.7 ± .72	10.8 ± .76
Testicular wt., g	64	602.1 ± 27.20	581.7 ± 25.20	522.3 ± 25.50	584.3 ± 27.20

[a] Implanted at day 0 and every 60 to 70 days.
[b] Implanted at days 0 and 180.
[c] Increase in height during the trial.
[d] Gain in scrotal circumference during the trial.
[e,f] Means in the same row not bearing a common superscript differ ($P<.05$).
*$P<.05$.

TABLE 2. LEAST-SQUARES MEANS FOR CARCASS TRAITS

	Control	Ralgro[a]	Synovex[a]	Compudose[b]
No. of observations	15	17	17	15
Hot carcass wt., kg*	318^{fg} ± 6.5	307^{g} ± 6.1	332^{f} ± 6.1	331^{f} ± 6.5
Longissimus muscle area, cm^2	78.8 ± 1.9	76.2 ± 1.7	8.7 ± 1.7	81.0 ± 1.9
Fat thickness, mg**	9.05^{g} ± .71	8.32^{g} ± .66	11.55^{f} ± .66	8.72^{f} ± .71
Est KPH fat, %[c]	1.4 ± .11	1.4 ± .10	1.5 ± .10	1.6 ± .11
USDA yield grade*	2.43^{g} ± .11	2.38^{g} ± .18	2.82^{f} ± .11	2.44^{g} ± .19
Marbling score[d]	4.36 ± .19	3.90 ± .18	4.19 ± .18	4.26 ± .19
USDA quality grade[e]	6.00 ± .25	5.00 ± .24	6.00 ± .24	6.00 ± .25
Dressing percentage*	61.0^{g} ± .46	61.7^{g} ± .44	62.6^{f} ± .44	63.2^{f} ± .46

[a] Implanted at day 0 and every 60 to 70 days.
[b] Implanted at days 0 and 180.
[c] Estimated kidney, pelvic and heart fat.
[d] Marbling 1-8, 1 = practically devoid, 4 = small, 8 = moderately abundant.
[e] Quality grade 1-8, 1 = low standard, 5 = high good, 8 = high choice.
[f,g] Means in the same row not bearing a common superscript differ ($P<.05$).
*$P<.05$.
**$P<.01$.