EFFECTS OF TRENBOLONE ACETATE IN YEARLING FEEDLOT STEERS ON CARCASS GRADE TRAITS AND SHEAR FORCE

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Story in Brief

Two trials with yearling steers were used to evaluate the effects of an androgenic implant, trenbolone acetate, in combination with an estrogenic implant (Synovex-S, Trial 1; Compudose-200, Trial 2) on carcass traits. Steers were assigned to one of four implant treatment groups (no TBA; TBA on day 0; TBA on day 70; TBA on days 0 and 70). All steers were fed a high concentrate diet and slaughtered. No significant differences were noted among treatment groups for carcass weight, fat thickness, percent internal fat, or marbling score. Carcasses from steers in Trial 1 which were doubly implanted with TBA had larger ribeyes, more desirable yield grades, more advanced lean maturity scores and darker lean color scores than carcasses from control steers. In both trials, the incidence of bullock characteristics in carcasses was increased for late and doubly TBA implanted steers. In Trial 1, the percentage of choice carcasses from doubly TBA implanted steers was slightly lower than those receiving no TBA (24.4 versus 33.4%). In Trial 2, the percentage of choice carcasses for late and doubly TBA implanted steers was significantly lower than the control group (30.5, 31.0 versus 51.4%). The results of this study indicate that the use of TBA early in the feeding period has a minimal effect on carcass traits. Late administration of TBA tended to reduce percentage of Choice and to increase muscling.

(Key Words: Feedlot Steers, Trenbolone, Implants, Carcass Traits.)

Introduction

Feedlots have used estrogenic anabolic implants to increase rate of gain and improve feed efficiency for many years. Recently, an androgenic steroid,

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trenbolone acetate (TBA), has been introduced to enhance growth beyond that produced by estrogenic compounds. In a feedlot study using yearling steers, Hicks et al. (1985) reported that Compudose plus a single TBA implant increased carcass gain and feed efficiency by 8.6 and 4.6%, respectively, compared to Compudose alone. The authors noted that dressing percentage and marbling score tended to be the lowest for steers receiving TBA implants.

There is very little information available concerning the impact of TBA implants on specific carcass traits and cooking properties. Because TBA is an androgenic compound, one would expect that several TBA production and carcass parameters could mirror those changes characteristically associated with the production of young intact males (bullocks). An extensive review of beef from intact males (Seideman et al., 1982) noted substantially greater average daily gain, feed efficiency and carcass leanness for young bulls than steers. Unfortunately, bullock carcasses commonly had lower quality grades, darker muscle color, and more variable tenderness than steer carcasses.

Variation in cooked beef tenderness usually is attributed to variation in carcass fatness (external and marbling) and subsequent rate of chill or to the amount of connective tissue in muscle. Lower sensory tenderness scores and higher collagen content are often reported for steaks from bulls than from steers.

Because TBA increases growth rate, it is being adopted rapidly by feedlot operators. Research is needed immediately to document any effects (positive or negative) of TBA on beef carcass characteristics and palatability attributes that may affect consumer acceptance. Therefore, the objective of this study was to examine the effects of androgenic implants (Finaplix-S)[5] when administered in combination with an estrogen (Synovex-S[6] or Compudose-200)[7] on USDA quality and yield grade traits, cooking properties, and shear force requirements of carcasses from feedlot steers. **At the time of this publication TBA has not been approved by the FDA for use in combination with either Synovex-S or Compudose-200.**

Materials and Methods

Yearling steers were utilized in two implant trials (one and two) at a commercial feedlot in the High Plains region. Steers in Trial 1 (n=291) were randomized by breed and assigned to one of four equally-sized implant treatment groups (Table 1). Group 1 steers received an initial estrogenic

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Table 1. Implant schedule for trial 1.

Implant period[a]	Treatment group 1	2	3	4
On-test	Synovex (SYN)	SYN + TBA	SYN only	SYN + TBA
Reimplant	SYN	SYN	SYN + TBA	SYN + TBA

[a]Implant periods: on-test = day 0 during processing; reimplant = day 70.

anabolic implant (Synovex-S) at processing (day 0) and were reimplanted with Synovex-S (SYN) on day 70 to serve as a control. The second group was implanted with SYN plus an androgenic steroid, trenbolone acetate (TBA), at processing and was reimplanted with SYN on day 70. Group 3 steers received SYN at processing and were reimplanted with SYN and TBA on day 70. The remaining steers (group 4) were implanted with SYN plus TBA at processing and were reimplanted with SYN and TBA at day 70.

Steers in Trial 2 (n=303) were randomized in a similar fashion and implanted with Compudose instead of Synovex as the estrogenic anabolic implant at the onset of the experiment (day 0). TBA was implanted with Compudose in treatment groups 2, 3 and 4 as outlined in Table 2.

Individual live weights (unshrunk) were obtained on day 1 for all steers. Steers in Trials 1 and 2 were fed a high concentrate diet for 139 and 134 days, respectively. All steers were commercially slaughtered and approximately 24 hours postmortem, complete USDA quality and yield grade data (USDA, 1987) were collected by an official USDA grader plus two experienced University personnel. In addition, all carcasses were assigned scores for lean color (8=pink, 7=light cherry-red, 6=cherry-red, 5=slightly dark red, 4=moderately dark red, 3=dark red, 2=very dark red, 1= black) and masculinity characteristics (bullock score: 5=no evidence, 4=slight, 3=moderate, 2=severe, 1=extremely severe). This bullock score reflects the extent of pizzle eye, bald spot and crest development.

Table 2. Implant schedule for trial 2.

Implant period[a]	Treatment group 1	2	3	4
On-test	Compudose (COMP)	COMP + TBA	COMP only	COMP + TBA
Reimplant	None	None	TBA	TBA

[a]Implant periods: on-test = day 0 during processing; reimplant = day 70.

A subsample of 240 carcasses in Trial 1 were randomly selected prior to grading for subsequent cooking property and shear force determinations. Approximately 48 hours postmortem, the ribeye roll (IMPS 112A) was fabricated from the left side of each carcass, vacuum packaged and transported to the Oklahoma State University Meat Laboratory. The cooler aging period was standardized at 6 days for all ribeye samples.

Ribeye rolls were crust frozen and faced before removing a steak (1.0 in. thick) for Warner-Bratzler shear force. All steaks were vacuum packaged and stored at -22°F. Steaks were thawed (35°F) for 24 hours and broiled on Farberware Open-Hearth broilers to an internal temperature of 158°F. Data were collected to assess cooking time (minutes to a medium degree of doneness) and cooking shrinkage (% weight loss). All steaks were cooled to 77°F and cored (.5 in. diameter) to determine the average (6 cores) pounds of force required for shearing.

Data were analyzed separately for each trial and the latter subset of cookery and shear steaks. All treatment groups were adjusted to a constant initial weight since many carcass traits are highly weight dependent. Least squares means were used to account for unequal treatment group sizes.

Results and Discussion

Least squares means for carcass grade traits from Trial 1 steers are presented in Table 3. Carcasses from steers implanted with TBA late in the feeding period (Treatments 3 and 4) were more advanced ($P<.05$) in lean maturity score and darker ($P<.05$) in muscle color than carcasses from control steers (Treatment 1) implanted with SYN alone. However, no significant differences were noted between Treatment (T) 2 (TBA early) and the controls. Carcasses from steers doubly implanted with TBA (T4) had significantly larger ribeyes and more desirable USDA yield grades than those from control (T1) and early TBA steers (T2). The incidence of bullock characteristics increased with the use of TBA; however, differences were only statistically significant between T1 versus T3 and T4, and T2 versus T4. No significant differences were noted between treatment groups for carcass weight, skeletal maturity, marbling score, fat thickness, percent internal fat (KPH) and percent yield grade 4 carcasses. The mean percentage Choice carcasses was quite low for this trial (30.6%). The lowest numerical percentage (24.4%) was obtained for Treatment 4 carcasses, however differences were not consistent enough for statistical significance.

The primary difference noted between Trials 1 and 2 pertained to the higher percentage (39.6%) of choice carcasses (Table 4) in the latter trial. This difference can be attributed primarily to the more advanced marbling scores that were apparent in the Trial 2 carcasses. Control (T1) carcasses

Table 3. Least squares means for carcass grade traits of steers implanted with synovex or synovex and trenbolone acetate.

Item	Implant treatment[a]			
	1	2	3	4
Number of steers	72	75	73	71
Carcass weight, lb.	689	699	692	693
Skeletal maturity[b]	A55	A58	A59	A56
Lean maturity[b]	A40[r]	A41[ra]	A47[ah]	A51[h]
Color score[c]	6.1[r]	6.0[ra]	5.8[h]	5.9[ah]
Marbling score[d]	S175	S183	S174	S161
Fat thickness, in.	.48	.46	.49	.40
Ribeye area, sq.in.	13.1[a]	13.3[a]	13.4[ra]	13.9[r]
Kidney, pelvic & heart fat, %	1.5	1.4	1.4	1.4
Yield grade	2.6[a]	2.5[a]	2.4[a]	2.1[r]
Percent choice	33.4	31.9	32.5	24.4
Percent yield grade 4's	3.2	5.5	1.6	1.6
Bullock score[e]	4.7[r]	4.6[ra]	4.4[ah]	4.3[h]

[a]Implant treatments: 1 = Synovex on days 0 and 70; 2 = Synovex + TBA on day 0, Synovex only on day 70; 3 = Synovex only on day 0, Synovex + TBA on day 70; 4 = Synovex + TBA on days 0 and 70.
[b]All carcass maturity score means were within "A" (9 to 30 months of age).
[c]Color score: 6 = cherry-red; 5 = slightly dark red.
[d]Marbling score: S1 = a "slight" amount corresponding to U.S. Select.
[e]Bullock score: 5 = no evidence; 4 = slight "bullock" characteristics.
[ra,ah]Values in the same row with a common superscript are not (P>.05) different.

attained a higher (P<.05) percentage of Choice than the late TBA treatment groups (T3 and T4). In fact, this difference exceeded 20% between the control and late TBA groups. The price spread between choice and select carcasses was reported as $7.00 per hundred pounds on the day these carcasses were sold (September 21, 1988 USDA National Carlot Meat Report). Using the average carcass weight (683 lb) and the 20% fewer choice carcasses for the 150 head in Treatments 3 and 4 combined, this monetary loss would be $47.81 per carcass or $1,434 for the 30 fewer Choice carcasses realized for the late TBA groups (T3 and T4).

The incidence of bullock characteristics followed a similar trend as noted in Trial 1. No significant differences were noted for scores related to lean color and ribeye area in Trial 2.

Cooking properties and shear force values for the ribeye steaks subsampled from Trial 1 are reported in Table 5. No differences (P>.05) were observed for resistance to shear, cooking time, and cooking shrinkage between treatment groups.

Table 4. Least squares means for carcass grade traits of steers implanted with compudose or compudose and trenbolone acetate.

Item	Implant treatment[a]			
	1	2	3	4
Number of steers	75	78	73	77
Carcass weight, lb.	680	672	685	682
Skeletal maturity[b]	A42[f]	A53[g]	A42[f]	A45[f]
Lean maturity[b]	A38	A41	A41	A40
Color score[c]	6.1	6.1	6.0	6.0
Marbling score[d]	Sm04	Sm03	Sl87	Sl85
Fat thickness, in.	.46	.47	.45	.49
Ribeye area, sq.in.	12.7	12.7	13.1	12.8
Kidney, pelvic & heart fat, %	1.5	1.6	1.5	1.5
Yield grade	2.6	2.6	2.4	2.6
Percent choice	51.4[f]	45.4[fg]	30.5[g]	31.0[g]
Percent yield grade 4's	2.3	1.9	0.9	1.7
Bullock score[e]	4.6[fg]	4.6[f]	4.4[gh]	4.3[h]

[a]Implant treatments: 1 = Compudose only on day 0; 2 = Compudose + TBA on day 0; 3 = Compudose on day 0, TBA on day 70; 4 = Compudose + TBA on day 0 and TBA on day 70.
[b]All carcass maturity score means were within "A" (9 to 30 months of age).
[c]Color score: 6 = cherry-red; 5 = slightly dark red.
[d]Marbling score: Sm = a "small" amount corresponding to U.S. Choice; Sl = a "slight" amount corresponding to U.S. Select.
[e]Bullock score: 5 = no evidence; 4 = slight "bullock" characteristics.
[fgh]Values in the same row with a common superscript letter are not statistically (P>.05) different.

Table 5. Least squares means for shear force values and cooking properties of ribeye steaks from steers implanted with synovex or synovex and trenbolone acetate.

Item	Implant treatment[a]			
	1	2	3	4
Number of steaks	59	60	58	59
Shear force, lb.	10.3[c]	10.0	10.4	10.6
Tough steaks, %[b]	34.7	21.8	30.1	43.9
Cooking time, min.	28.7	28.0	27.8	28.7
Cooking shrinkage, %	32.8	31.5	31.7	31.9

[a]Implant treatments: 1 = Synovex on days 0 and 70; 2 = Synovex + TBA on day 0, Synovex only on day 70; 3 = Synovex only on day 0, Synovex + TBA on day 70; 4 = Synovex + TBA on days 0 and 70.
[b]Percentage of steaks with shear force values of 11.0 pounds or higher.
[c]All comparisons were nonsignificant (P>.05).

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