Effects of Compudose® Implants from Birth to Slaughter on Carcass and Meat Traits of Young Bulls and Steers

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Summary

Implanting young bulls with Compudose® three times from birth to slaughter resulted in performance similar to that of nonimplanted bulls, but decreased masculinity development. Implanted bulls tended to have higher marbling scores, more tender meat, more youthful carcasses, and lighter lean color than nonimplanted bulls. Although both implanted and nonimplanted bulls were more efficient and gained faster in the feedlot than implanted steers, the steers showed very little carcass masculinity and had finer-textured lean. Implanted steers had more youthful carcasses and lower Warner-Bratzler shear values than nonimplanted bulls. However, nonimplanted bulls grew faster, were more efficient, had larger ribeyes and lower yield grade numbers than implanted steers.

For large-framed cattle, castration and implanting with Compudose® near birth result in the most desirable combination of performance, carcass, and meat quality traits.

Introduction

Increased concern about fat in the American diet has prompted consumer preference for leaner beef. Consequently, the beef industry has renewed its interest in feeding non-castrated males in an effort to produce meat more efficiently and meet the consumers' desire for a leaner product. Some of the problems in the use of bulls for beef include dark and coarsely textured lean, excessive fullness and thickness of the neck, and management problems. In addition, meat may be less tender, and have lower marbling and/or quality grades. Implanting young bulls with "estrogen-like" substances has reduced some of these problems, while retaining many of the advantages that young bulls have. Implanting young bulls with Compudose® - a natural rather than synthetic estrogen - may improve carcass and meat traits without sacrificing their performance advantages.

Experimental Procedure

Twenty-eight Simmental bulls were randomly assigned to one of three treatments at birth. Ten calves remained intact and were implanted (IB) with Compudose®. Nine calves were castrated at birth and implanted (IS) with Compudose®. The remaining nine calves were intact, nonimplanted controls (CB). Calves were implanted near birth, at weaning and at approximately 200 days after weaning. Calves were weaned at 7.5 months of age and fed an 85% concentrate diet at the Kansas State University Beef Cattle Research Unit until slaughter at the university meat laboratory. Hip heights, masculinity scores, and scrotal circumferences were measured at 8.5 months of age and again just prior to slaughter.

Cattle were slaughtered at an average age of 14.8 months. Testicular weights were determined at slaughter. Carcass masculinity (size of crest, jump muscle, and pizzle eye), marbling scores, and USDA yield grade data were obtained at 24 hr postmortem. The wholesale rib section was removed at 48 hr postmortem, vacuum packaged and aged in a cooler for 10 days. Two 1 inch-thick steaks from the 12th rib region were cooked to 156°F for Warner-Bratzler shear force determinations and trained taste panel evaluations.

Results

Implanting bulls and steers with Compudose® from near birth to slaughter did not affect hip height at 8.5 or 14.8 months of age. However, masculinity scores were lowest ($P<.05$) for IS, and IB were less ($P<.05$) masculine than CB. Scrotal circumferences were lower ($P<.05$) for IB than for CB at both 8.5 and 14.8 months of age (Table 26.1).

Average daily gains were greater ($P<.05$) for CB than for IS, whereas IB were intermediate to CB and IS (Table 26.2). Feed per pound of gain was similar for CB and IB, but IS were less efficient than either CB or IB. Although slaughter and carcass weights were not significantly different, CB tended ($P<.10$) to be heavier than IS, and IB were intermediate (Table 26.3). Dressing percentages were not different among treatments. Implanted steer carcasses were more ($P<.05$) youthful than CB carcasses, and IB tended to be more youthful than CB. Marbling scores among treatments were not significantly different, although CB tended to be lowest. Similar marbling scores for IS and IB were unexpected because IB had significantly less ($P<.05$) fat thickness than IS. Ribeye areas were smaller and yield grades were higher for IS than for CB. Yield grades for IB and CB were equal, although CB tended ($P<.10$) to have larger ribeye areas. Although testical weights were similar for IB and CB, the variability was much greater for IB. Carcass masculinity was lowest ($P<.05$) for IS, and IB were less ($P<.05$) masculine than CB. Consequently, implanting young bulls with Compudose® effectively retarded masculinity and made bull carcasses more acceptable.

Lean color and firmness were not significantly different among treatments, but CB tended ($P<.10$) to be darker than IS and IB. Implanted steers had finer ($P<.05$) textured ribeyes than IB and CB. The incidence of heat ring (dark, coarse band in the ribeye) was higher ($P<.05$) for IB than IS, whereas CB were intermediate (Table 26.4). The higher incidence of heat ring in IB was likely due to less insulation (less fat cover) of the ribeye muscle during chilling.

A trained taste panel found no significant differences in flavor intensity, connective tissue amount, or myofibrillar or overall tenderness among treatments (Table 26.5). However, IB tended to be more tender than CB, whereas IS were intermediate. In addition, IB were more ($P<.05$) juicy than CB and IS were intermediate in juiciness. Warner-Bratzler shear-force values were lower ($P<.05$) (more tender) for IS than for CB, whereas IB were intermediate.

Implanting young bulls from birth to slaughter reduced their masculinity and scrotal circumferences both at 8.5 mo and at slaughter, resulting in carcasses that would be more acceptable to meat packers.

Implanted bulls tended to have more youthful carcasses, higher marbling scores, lighter lean color, and more tender meat than CB. In addition, IB were more efficient and tended to gain faster than IS. Furthermore, IB had lower yield grades than IS.

In spite of the improvements from implanting bulls, IS still were superior to both IB and CB for live and carcass masculinity and texture of lean. Although IS had a higher yield grade (2.4) than IB and CB (both 1.9), and had more fat thickness (.32 in) than IB (.20 in), IS carcasses were more desirable. This would compensate for their less efficient gains.

For large-framed cattle like these, the IS treatment resulted in the most desirable combination of performance, carcass, and meat quality traits.

Table 26.1. Hip Heights and Masculinity Characteristics for Control Bulls and Compudose®-Implanted Bulls and Steers.

Item	Implanted steers	Implanted bulls	Control bulls
Hip Height at 8.5 months, in.	46.5	45.8	46.7
Hip Height at slaughter, in.	54.6	53.7	53.9
Masculinity score at 8.5 months[1]	1.2[a]	2.2[b]	3.9[c]
Masculinity score at slaughter[1]	1.4[a]	3.6[b]	4.6[c]
Scrotal circumference at 8.5 months, cm.	—	19.5[a]	27.0[b]
Scrotal circumference at slaughter, cm.	—	38.7[a]	42.4[b]

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

[a,b,c]Means in the same row with different superscript letters differ (P<.05).

Table 26.2. Performance Characteristics for Control Bulls and Compudose® - Implanted Bulls and Steers.

Item	Implanted steers	Implanted bulls	Control bulls
Weaning wt., lb	624[ab]	595[a]	643[b]
Slaughter wt., lb	1334	1357	1427
Average daily gain, lb	3.40[a]	3.64[ab]	3.79[b]
Feed/lb of gain (DM basis)	6.80[a]	5.96[b]	6.12[b]

[a,b]Means in the same row with different superscript letters differ (P<.05).

Table 26.3. Carcass Characteristics of Control Bulls and Compudose®-Implanted Bulls and Steers.

Item	Implanted steers	Implanted bulls	Control bulls
No. of animals	9	10	9
Slaughter wt., lb	1334	1357	1427
Hot Carcass wt., lb	835	854	911
Dressing percentage	62.6	62.9	63.8
Carcass maturity	A[62a]	A[66ab]	A[76b]
Marbling score	Slight[90]	Slight[94]	Slight[62]
Fat thickness, in	.32[a]	.20[b]	.28[ab]
Ribeye area, in^2	14.1[a]	14.9[ab]	16.1[b]
Yield grade	2.4[a]	1.9[b]	1.9[b]
Testicular wt., gram	—	623	693
Jump muscle and crest[1]	1.4[a]	3.4[b]	5.0[c]
Pizzle eye size[2]	1.8[a]	3.0[b]	4.2[c]

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

[2]Scores of 1 to 7: 2 = moderately small, 3 = slightly small and 4 = slightly large.

[a,b,c]Means in the same row with different superscript letters differ (P<.05).

Table 26.4. Ribeye (Longissimus) Quality Characteristics for Control Bulls and Compudose®-Implanted Bulls and Steers.

Item	Implanted steers	Implanted bulls	Control bulls
Lean firmness[1]	6.2	6.3	6.4
Lean texture[2]	5.4[a]	4.1[b]	4.0[b]
Lean color[3]	3.7	3.7	4.5
Heat ring (Dark coarse band)[4]	1.0[a]	1.8[b]	1.3[ab]

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

[2]Scores of 1 to 8: 4 = slightly coarse, 5 = slightly fine, 6 = moderately fine.

[3]Scores of 1 to 9: 3 = light cherry red, 4 = cherry red, 5 = slightly dark red.

[4]Scores of 1 to 5: 1 = none, 2 = slight.

[a,b]Means in the same row with different superscript letters differ (P<.05).

Table 26.5. Taste Panel Evaluation and Warner-Brazler Shear Values of the Ribeye (Longissimus) for Control Bulls and Compudose®-Implanted Bulls and Steers.

Item	Implanted steers	Implanted bulls	Control bulls
Flavor intensity[1]	5.8	5.8	5.4
Juiciness[1]	5.4[ab]	5.8[a]	5.2[b]
Connective tissue amount[1]	6.5	6.4	6.0
Myofibrillar tenderness[2]	5.4	5.8	5.2
Overall tenderness[2]	5.6	5.8	5.4
Warner-Bratzler shear, lb	8.7[a]	9.7[ab]	11.4[b]

[1]6 = slightly intense, slightly juicy or slight amount, 7 = very intense, very juicy or practically none.

[2]Scores of 1 to 8: 5 = slightly tender, 6 = moderately tender and 7 = very tender.

[a,b]Means in the same row with different superscript letters differ (P<.05).