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## Effects of Ralgro® Implants from Birth to Slaughter on Carcass and Meat Traits of Young Bulls

J.A. Unruh, D.G. Gray, and M.E. Dikeman

### Summary

Implanting young bulls with Ralgro® from birth to slaughter maintained performance similar to nonimplanted bulls, increased quality grade and carcass fatness, delayed carcass masculinity development, decreased hide weight and thickness, and improved some meat palatability traits. Our results indicate that implanting young bulls with Ralgro® from birth to slaughter improves the traits cited most often by beef packers as reasons for discriminating against young bulls for meat production.

### Introduction

Carcasses from young bulls are frequently inadequately finished and have lower quality grades at live and carcass weights than desired by packers. Also, bulls are often rejected from boxed beef fabrication because of dark and coarsely textured lean, excessive fullness and thickness of the neck, and large ribeye, round, and jump muscles. In addition, the thick and heavy hides of bulls are economically unattractive and are related to difficulties in skinning and hide curing procedures. Implanting with Ralgro® from near birth until slaughter has been indicated as a possible method of reducing some of these problems, while retaining many of the advantages of feeding young bulls.

### Experimental Procedures

Thirty-six of 72 Simmental bulls were implanted (I) with 36 mg Ralgro® at birth and at average intervals of 84 days until slaughter. The remaining 36 bulls were nonimplanted controls (C). Calves were weaned at 7.7 months and placed on an 85% concentrate diet until slaughter at a commercial packing plant<sup>1</sup>. Bulls were slaughtered at 12.0, 13.8, 15.7, and 17.4 months of age. At slaughter, hide samples from the forehead were cleaned and frozen. Later, these samples were trimmed to a constant area, weighed, and dermis thickness was measured. Carcass masculinity (size of crest, jump muscle, and pizzle eye) and USDA quality and yield grade data were obtained at 24 hr. postmortem. The wholesale ribs were shipped to KSU where two 1 in.-thick steaks from the 12th rib region were removed 7 days postmortem for Warner-Bratzler shear force determinations and taste panel evaluations.

<sup>1</sup> Appreciation is extended to Roode Packing Co., Fairbury, Nebraska for their cooperation in slaughtering these bulls.

## Results

Slaughter and carcass weights and dressing percentages were similar ( $P>.10$ ) for I and C bulls (Table 28.1). Measures of carcass fatness (fat thickness, marbling score, and yield grade) were greater ( $P<.05$ ) for I than for C bulls. Skeletal maturity was greater ( $P<.05$ ) for C bulls, but lean maturity was greater for I bulls. As a result, overall maturity was similar ( $P>.10$ ) for I and C bulls. Hide weight and dermis thickness (hide connective tissue layer) were less ( $P<.05$ ) for I than C bulls. Thus, implanting may reduce the frequently cited skinning and curing problems of thick, heavy bull hides.

Indicators of carcass muscling and masculinity (ribeye area, jump muscle and crest) showed that I and C bulls had similar ( $P>.10$ ) means at 12.0 months, C bulls had greater ( $P<.05$ ) means at 13.8 months, and I and C bulls had similar ( $P>.10$ ) means at 15.7 and 17.4 months of age (Table 28.2). These data suggest that muscle growth and maturation of young bulls is delayed by implanting with Ralgro® from birth to slaughter, since C bulls reached a muscle and masculinity development plateau by 13.8 months and I bulls reached their development plateau by 15.7 months of age.

A trained taste panel found that ribeye steaks from I bulls had less ( $P<.05$ ) connective tissue but similar ( $P>.10$ ) flavor intensity and juiciness compared to C steaks (Table 28.3). Ribeye myofibrillar and overall tenderness ratings indicated that I bulls at 12.0 and 13.8 months were more tender ( $P<.05$ ) than C bulls at 13.8 and 17.4 months of age (Table 28.2). Although not significant ( $P>.10$ ), I bulls tended to have lower (more tender) Warner-Bratzler shear values (Table 28.3).

Our study indicates that implanting young bulls from birth to slaughter improves the traits cited most often by packers as reasons for discriminating against using young bulls in the boxed beef and retail trade. Large-framed bulls implanted with Ralgro® could be used in consumer-preferred lean beef production systems by feeding them to about 14 months of age (as opposed to 12 months for C bulls) before increased carcass masculinity becomes apparent. Implanting would also improve carcass quality.

We speculate that implanting small and medium-framed bulls with Ralgro® from birth to slaughter may provide a production option preferable to castrates in some marketing systems. With beef packers' current desire to slaughter heavier cattle, implanting small and medium-framed bulls with Ralgro®, as opposed to castration, allows for greater performance and heavier, more desirable carcasses. In addition, implanting retards masculinity development and improves carcass quality and fatness compared to nonimplanted bulls.

Table 28.1. Carcass Characteristics of Ralgro®-implanted and Control Bulls

Item	Implant	Control
No. of Bulls	36	36
Slaughter Wt., lb	1188	1199
Hot carcass Wt., lb	719	730
Dressing Percentage	60.3 <sup>c</sup>	60.9 <sup>d</sup>
Fat Thickness, in	.20 <sup>c</sup>	.14 <sup>d</sup>
Skeletal Maturity	A-59 <sup>c</sup>	A-49 <sup>d</sup>
Lean Maturity	A-49 <sup>c</sup>	A-60 <sup>d</sup>
Marbling Score	Slight 54 <sup>c</sup>	Slight 24 <sup>d</sup>
Yield Grade	1.9 <sup>c</sup>	1.5 <sup>d</sup>
Hide Weight, gm/cm <sup>2a</sup>	1.77 <sup>c</sup>	1.94 <sup>d</sup>
Dermis Thickness, in <sup>a</sup>	.45 <sup>c</sup>	.52 <sup>d</sup>
Pizzle Eye Size <sup>b</sup>	3.4	3.7

<sup>a</sup> Forehead hide sample, approximately 64 in<sup>2</sup>.

<sup>b</sup> Scores of 1 to 7: 2 = moderately small, 3 = slightly small and 4 = slightly large.

<sup>cd</sup> Means in the same row with different superscripts differ (P<.05).

Table 28.2. Treatment x Slaughter Age Interaction Means of Ralgro®-implanted and Control Bulls

Item	Slaughter Age, in Months							
	12.0		13.8		15.7		17.4	
	Implant	Control	Implant	Control	Implant	Control	Implant	Control
No. of Bulls	9	9	9	9	9	9	9	9
Carcass:								
Ribeye Area, in <sup>2</sup>	11.5 <sup>c</sup>	11.9 <sup>c</sup>	13.2 <sup>d</sup>	15.3 <sup>e</sup>	14.5 <sup>e</sup>	14.4 <sup>e</sup>	14.2 <sup>de</sup>	14.7 <sup>e</sup>
Jump Muscle <sup>a</sup>	1.9 <sup>c</sup>	2.2 <sup>c</sup>	2.0 <sup>c</sup>	3.2 <sup>d</sup>	3.2 <sup>d</sup>	3.4 <sup>d</sup>	3.3 <sup>d</sup>	3.7 <sup>d</sup>
Crest <sup>a</sup>	2.1 <sup>c</sup>	2.2 <sup>c</sup>	1.8 <sup>c</sup>	3.1 <sup>d</sup>	3.4 <sup>d</sup>	3.0 <sup>d</sup>	3.5 <sup>d</sup>	3.5 <sup>d</sup>
Sensory Panel:								
Myofibrillar Tenderness <sup>b</sup>	6.4 <sup>e</sup>	5.9 <sup>cde</sup>	6.4 <sup>e</sup>	5.4 <sup>c</sup>	6.0 <sup>cde</sup>	6.3 <sup>de</sup>	6.1 <sup>de</sup>	5.8 <sup>cd</sup>
Overall Tenderness <sup>b</sup>	6.5 <sup>e</sup>	6.0 <sup>cde</sup>	6.4 <sup>e</sup>	5.5 <sup>c</sup>	6.0 <sup>cde</sup>	6.3 <sup>de</sup>	6.1 <sup>de</sup>	5.8 <sup>cd</sup>

<sup>a</sup> Scores of 1 to 6: 2=barely evident, 3=slightly prominent and 4=moderately prominent.

<sup>b</sup> Scores of 1 to 8: 5=slightly tender, 6=moderately tender and 7=very tender.

<sup>cde</sup> Means in the same row with different superscripts differ (P<.05).

Table 28.3. Evaluations of Ribeye (Longissimus) by Sensory Panel and Warner-Bratzler Shear Values for Ralgro®-implanted and Control Bulls

Item	Implant	Control
No. of Steaks	36	36
Flavor Intensity <sup>a</sup>	6.2	6.2
Juiciness <sup>a</sup>	6.4	6.3
Connective Tissue Amount <sup>a</sup>	6.6 <sup>b</sup>	6.3 <sup>c</sup>
Warner-Bratzler Shear, lb	6.6	7.1

<sup>a</sup> 6=slt. intense, slt. juicy or slight; 7=very intense, very juicy or practically none.

<sup>b,c</sup> Means in the same row with different superscripts differ (P<.05).

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#### How Does Ralgro® Work?

Zeranol is a naturally occurring estrogen originally derived from corn mold, and is sold under the tradename, Ralgro®. The compound is formulated into implants to be placed under the skin at the base of the ear. That allows the active ingredient to be released slowly over time. Ralgro improves growth rate by up to 0.25 lb per day, and feed efficiency by 8 to 10 percent. It accomplishes this by stimulating the pituitary gland to produce extra growth hormone, prolactin, and cortisol. Those compounds, in turn, increase the rate at which the animal produces protein. Increased protein synthesis accounts for the increased gain and feed efficiency. Because Ralgro works completely different from products like Rumensin® or Bovatec® -- compounds that modify the rumen fermentation -- their effects are additive when combined.

Ralgro is safe -- less toxic than aspirin. It is not a carcinogen, as shown by monkey tests at 27,000 times the dose for cattle, for 10 years. There has never been a residue violation with Ralgro implants in over 12 years of use. However, since Ralgro is an estrogenic compound, it should not be used in young cattle that might later be chosen for breeding.

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