

# Feeding High Quality Beef for Efficiency

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### Introduction

Hormonal implants in beef cattle have been studied for decades and proven to be an effective tool to improve performance efficiency. However, the beef industry has made significant improvement in the genetic base of cattle with more cattle capable of grading premium Choice and Prime. Minimal research has evaluated the impacts of nutritional and implant management on cattle bred for superior carcass quality. The objective was to assess the effects of dietary energy and implant potency to determine optimum strategies for managing feed conversion and marbling.

### Materials and Methods

Fifty-four Angus steers ( $722 \pm 88$  lb;  $n = 9$ /treatment) from the ISU McNay Research Farm herd were fed for 144 days at the ISU Armstrong Research Farm, Lewis Iowa, in pens equipped with bunks capable of monitoring individual animal intake. Steers were allotted between two nutritional programs: 1) a lower energy finishing ration (59 NEg, 18% roughage level; LE) or 2) a higher energy finishing ration (63 NEg, 8% roughage; HE). Within each dietary treatment, one of three implant strategies was applied: 1) no implant (NIMP); 2) a conservative implant strategy (total of 160 mg trenbolone acetate (TBA) delivered throughout the study; Revalor-IS on d 0 and d 74; RIS); or 3) an aggressive implant strategy (total of 400 mg TBA delivered throughout the study; Revalor-200 on d 0 and d 74; R200).

Individual body weights were collected on two consecutive dates at the start and conclusion of the trial as well as at reimplant time (d74). Ribeye area, intramuscular fat, and 12<sup>th</sup> rib backfat thickness were collected via carcass ultrasound on d 0, 74, and 144 to track marbling deposition throughout the study. Steers were harvested at a commercial packing plant (Iowa Premium, Tama, IA), and individual animal carcass data were collected.

### Results and Discussion

Steers fed the HE diet had improved average daily gain, heavier live and carcass weights, and larger ribeye areas compared with steers fed LE. Dry matter intake between the two dietary treatment groups was not different, so LE-fed steers had poorer feed conversion. Additionally, the LE-fed steers had lower marbling scores than HE-fed steers, indicating the lower energy finishing diet was limiting nutrients and ultimately hindered growth and marbling ability when harvested on the same day as steers on a higher plane of nutrition.

As expected, average daily gain as well as live and carcass weights linearly improved in response to TBA dosage. Like dietary treatments, implant treatment did not impact feed intake. Therefore, feed conversion was poorest for NIMP, intermediate for RIS, and best for R200. Of most interest, TBA dosage had no impact on marbling score. Furthermore, carcass ultrasound intramuscular fat was not impacted by implant treatment at reimplant timing or at study conclusion.

### Conclusions

This study demonstrates the value of efficient gain when utilizing a comprehensive implant strategy as well as a more nutrient dense finishing diet. The data supports that when steers are implanted more aggressively,

additional energy is needed to support the added growth response from the implant and to maintain marbling deposition. In summary, implanting has no negative side effects on marbling deposition of cattle with known genetic potential to grade, when administered properly.

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**Table 1. Growth performance of steers based on nutritional program and implant strategies.<sup>a</sup>**

	HE Diet			LE Diet			SEM	Diet	IMP	Diet X IMP
	NIMP	RIS	R200	NIMP	RIS	R200				
<b>Body weight, lb</b>										
D 0	720	713	728	719	729	721	17.1	0.91	0.99	0.92
D 74	976	1,014	1,058	981	1,025	1,059	7.1	0.55	<0.01	0.92
D 144	1,224	1,304	1,337	1,167	1,270	1,336	8.4	0.01	<0.01	0.17
<b>Average daily gain, lb/d</b>										
D 0-73	3.43	3.95	4.54	3.50	4.10	4.55	0.096	0.56	<0.01	0.92
D 74-144	3.55	4.14	4.00	2.66	3.50	3.96	0.096	<0.01	<0.01	0.04
D 0-144	3.49	4.04	4.27	3.10	3.80	4.27	0.058	0.01	<0.01	0.17
<b>Dry matter intake, lb</b>										
D 0-73	24.2	23.8	23.1	23.9	25.0	23.1	0.70	0.77	0.54	0.79
D 74-144	23.7	24.3	24.1	23.9	28.2	24.5	0.79	0.18	0.19	0.31
D 0-144	24.0	24.0	23.6	23.9	26.6	23.8	0.71	0.38	0.38	0.50
<b>Feed conversion, lb/d</b>										
D 0-73	7.26	6.22	5.09	6.93	6.12	5.15	0.225	0.70	<0.01	0.88
D 74-144	7.03	6.04	6.17	9.03	8.04	6.32	0.290	0.01	0.01	0.11
D 0-144	7.14	6.12	5.64	7.98	7.09	5.74	0.209	0.04	<0.01	0.44

<sup>a</sup>HE = high energy diet; LE = low energy diet; NIMP = no implant administered; RIS = Revalor-IS administered on d 0 and d 74 (total of 160 mg of TBA delivered); R200 = Revalor 200 administered on d 0 and d 74 (total of 400 mg of TBA delivered).

**Table 2. Carcass characteristics of steers based on nutritional program and implant strategies.<sup>a</sup>**

	HE Diet			LE Diet			SEM	Diet	IMP	Diet X IMP
	NIMP	RIS	R200	NIMP	RIS	R200				
HCW, lb	770	840	876	746	815	851	7.3	0.02	<0.01	0.99
REA, sq in.	12.75	13.06	13.81	12.18	12.99	13.33	0.104	0.01	<0.01	0.34
YG	2.8	3.3	3.4	3.2	3.2	2.9	0.11	0.64	0.35	0.04
RF, in.	0.74	0.98	0.91	0.83	0.83	0.67	0.051	0.18	0.33	0.17
MS	821	800	806	808	742	758	14.6	0.06	0.21	0.64

HE = high energy diet; LE = low energy diet; NIMP = no implant administered on d 0 and d 74; RIS = Revalor-IS administered on d 0 and d 74 (total of 160 mg of TBA delivered); R200 = Revalor 200 administered on d 0 and d 74 (total of 400 mg of TBA delivered); HCW = hot carcass weight; REA = ribeye area; YG = yield grade; RF = 12<sup>th</sup> rib back fat thickness; MS = marbling score (600 = average Choice; 700 = high Choice; 800 = low Prime).

**Table 3. Carcass ultrasound characteristics of steers based on nutritional program and implant strategies.<sup>a</sup>**

	HE Diet			LE Diet			SEM	Diet	IMP	Diet X IMP
	NIMP	RIS	R200	NIMP	RIS	R200				
<b>Intramuscular fat<sup>b</sup>, %</b>										
D 0	4.9	4.7	4.9	4.8	5.1	5.1	0.157	0.61	0.89	0.77
D 74	8.9	7.5	7.9	7.5	8.0	8.0	0.260	0.98	0.95	0.76
D 144	11.4	9.8	11.1	10.7	10.4	9.5	0.263	0.28	0.28	0.20

<sup>a</sup>HE = high energy diet; LE = low energy diet; NIMP = no implant administered; RIS = Revalor-IS administered on d 0 and d 74 (total of 160 mg of TBA delivered); R200 = Revalor 200 administered on d 0 and d 74 (total 400 mg of TBA delivered).

<sup>b</sup>4.0% = low Choice; 5.6% = average Choice; 7.0% = high Choice; 8.6% = low Prime; 10.0% = average Prime).