

# Effects of Nutritional Management and Implant Strategies on Growth and Carcass Characteristics of Angus Steers Pre-Selected for Superior Marbling

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### Introduction

The beef industry has made rapid genetic selection for improved marbling. Although the industry has experienced an increase in USDA Prime-grading carcasses, research using modern day technology on high quality genetic potential cattle has been lagging behind the trend. Therefore, the objective of this study was to determine growth and carcass characteristics of steers with known genetic potential for high marbling capabilities when fed differing nutritional strategies and administering different implant programs.

### Materials and Methods

Sixty Angus steers ( $624 \pm 9.7$  lb) from the ISU McNay Research herd were utilized in a 2 x 2 factorial design study evaluating the effects of nutritional and implant management. Dietary treatments included 1) FIN-finishing diet (63 NEg; 12% roughage), or 2) BKG-backgrounding diet (57 NEg, 30% roughage) fed first 70 days before transitioning to finishing diet. Implant strategies included 1) ONE-a single, long duration implant administered on d0 (Synovex One Feedlot, Zoetis), or 2) SCC-a multiple, regular duration implant strategy (Synovex S on d0, Synovex Choice on d70 and d155, Zoetis) designed to match trenbolone acetate delivery of 200 mg. Steers were stratified to

treatment by marbling potential and initial body weight (BW) and fed via bunks to capture individual steer feed disappearance ( $n = 15$  steers/treatment).

Individual BW were collected on two consecutive dates at the start and conclusion of the trial as well as on d70 and 155 at reimplant. Carcass ultrasound was collected on d0, 70, 155, and 187 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

Steer BW, average daily gain (ADG), dry matter intake (DMI), and feed conversion results are shown in Table 1. During the initial implant period (d0–70), implant treatment had no effect on any growth parameter. However, steers on BKG treatment had greater DMI and lower ADG, as expected based on roughage levels of the two dietary treatments. Because of this increase in DMI during the first implant period, overall DMI, and thus feed conversion, were less desirable in BKG steers compared with FIN steers.

The lower energy BKG diet also hindered intramuscular fat (IMF) deposition when measured via ultrasound on d70 and 155 (Table 2). During the last 35 days of feed, there was an implant difference driven by steers on the SCC treatment depositing virtually no additional marbling, whereas ONE-implanted steers continued to deposit additional IMF.

Final marbling also confirmed the SCC steers tending to have lower marbling scores compared with ONE-steers (Table 3). This was likely due to the limited time on the last implant.

### Conclusions

Overall, steers on this study selected for enhanced marbling graded 100 percent USDA Choice and higher with 65 percent of

carcasses grading USDA Prime. These results indicate great potential exists for using implants and higher energy diets to increase efficiency without compromising carcass quality when feeding steers for a high-quality beef market.

### Acknowledgements

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**Table 1. Growth performance of steers receiving 200 mg trenbolone acetate (TBA) delivered through a single, long duration<sup>a</sup> or a series<sup>b</sup> of implants and fed a conservative<sup>c</sup> or aggressive<sup>d</sup> feeding strategy.**

	BKG <sup>c</sup> x ONE <sup>a</sup>	BKG <sup>c</sup> x SCC <sup>a</sup>	FIN <sup>d</sup> x ONE <sup>b</sup>	FIN <sup>d</sup> x SCC <sup>b</sup>	SEM	Diet	IMP <sup>f</sup>	Diet x IMP
<b>Body weight, lb</b>								
d0	599	598	602	596	19.0	0.96	0.87	0.90
d70	802	792	826	840	7.6	<0.01	0.76	0.14
d155	1145	1137	1142	1184	12.6	0.09	0.18	0.05
d187 <sup>e</sup>	1273	1289	1246	1316	16.0	0.78	0.02	0.06
<b>Average daily gain, lb/d</b>								
d0-187	3.60	3.65	3.46	3.83	0.086	0.77	0.02	0.06
<b>Dry matter intake, lb/hd</b>								
d0-187	22.4	22.6	20.7	21.5	0.52	0.01	0.38	0.56
<b>Feed conversion (feed to gain ratio)</b>								
d0-187	6.22	6.19	5.98	5.61	0.044	0.03	0.27	0.37

<sup>a</sup>ONE = Synovex ONE Feedlot implant administered d0.

<sup>b</sup>SCC = Synovex S implant administered d0, Synovex Choice implant administered d70 and d155.

<sup>c</sup>BKG = Fed a backgrounding diet for 70 days prior to being transitioned to finishing diet.

<sup>d</sup>FIN = Fed a finishing diet beginning d0.

<sup>e</sup>Carcass adjusted final body weight using a standard 65.7% dress.

<sup>f</sup>IMP = implant effect.

**Table 2. Deposition of intramuscular fat (percent) of steers receiving 200 mg trenbolone acetate (TBA) delivered through a single, long duration<sup>a</sup> or a series<sup>b</sup> of implants and fed a conservative<sup>c</sup> or aggressive<sup>d</sup> feeding strategy.**

	BKG <sup>c</sup> x ONE <sup>a</sup>	BKG <sup>c</sup> x SCC <sup>a</sup>	FIN <sup>d</sup> x ONE <sup>b</sup>	FIN <sup>d</sup> x SCC <sup>b</sup>	SEM	Diet	IMP <sup>e</sup>	Diet x IMP
IMF %								
d0	3.7	3.8	3.9	3.7	0.10	0.68	0.87	0.41
d70	4.3	4.2	5.2	4.8	0.12	0.01	0.17	0.72
d155	7.2	6.9	8.4	7.9	0.24	0.06	0.16	0.93
d187	8.7	7.4	9.3	7.9	0.27	0.32	0.01	0.76

<sup>a</sup>ONE = Synovex ONE Feedlot implant administered d0.

<sup>b</sup>SCC = Synovex S implant administered d0, Synovex Choice implant administered d70 and d155.

<sup>c</sup>BKG = Fed a backgrounding diet for 70 days prior to being transitioned to finishing diet.

<sup>d</sup>FIN = Fed a finishing diet beginning d0.

<sup>e</sup>IMP = implant effect.

**Table 3. Carcass characteristics of steers receiving 200 mg trenbolone acetate (TBA) delivered through a single, long duration<sup>a</sup> or a series<sup>b</sup> of implants and fed a conservative<sup>c</sup> or aggressive<sup>d</sup> feeding strategy.**

	BKG <sup>3</sup> x ONE <sup>1</sup>	BKG <sup>3</sup> x SCC <sup>2</sup>	FIN <sup>4</sup> x ONE <sup>1</sup>	FIN <sup>4</sup> x SCC <sup>2</sup>	SEM	Diet	IMP <sup>j</sup>	Diet x IMP
HCW <sup>e</sup> , lb	836.1	840.6	822.0	862.4	10.54	0.78	0.02	0.06
REA <sup>f</sup> , sq in	13.93	13.78	13.74	13.80	0.13	0.68	0.93	0.55
BF <sup>g</sup> , in	0.56	0.57	0.57	0.60	0.018	0.50	0.59	0.80
YG <sup>h</sup>	3.1	3.2	3.2	3.4	0.06	0.42	0.21	0.59
MS <sup>i</sup>	792	768	831	769	12.7	0.43	0.10	0.46

<sup>a</sup>ONE = Synovex ONE Feedlot implant administered d0.

<sup>b</sup>SCC = Synovex S implant administered d0, Synovex Choice implant administered d70 and d155.

<sup>c</sup>BKG = Fed a backgrounding diet for 70 days prior to being transitioned to finishing diet.

<sup>d</sup>FIN = Fed a finishing diet beginning d0.

<sup>e</sup>Hot carcass weight.

<sup>f</sup>Ribeye area.

<sup>g</sup>12<sup>th</sup> rib backfat thickness.

<sup>h</sup>Calculated yield grade.

<sup>i</sup>Marbling score. 700 = high choice; 800 = low prime.

<sup>j</sup>IMP = implant effect.