Growth Response and Carcass Characteristics of Yearling Steers Subjected to Differing Implant Strategies

A. S. Leaflet R1728

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Summary

A 106-day demonstration utilizing yearling steers to measure feedlot performance and carcass response to implant strategies was conducted at the ISU Allee Demonstration Farm. Treatments were: 100 mg progesterone + 10 mg estradiol benzoate (Component® EC) on day 0 followed by 120 mg trenbolone acetate + 24 mg estradiol (Component® TES) implant 57 days later, or 120 mg trenbolone acetate + 24 mg estradiol (Component® TES) only on day 0. The control group received no implant. The steers were weighed every 28 days and ultrasound data were collected from demonstration initiation until slaughter. The cattle were marketed as one group on d 106 of the demonstration. Implanted cattle had higher average daily gains, heavier carcass weights, larger rib eye areas, and tended to have improved feed efficiency over control steers. Additionally, the reimplanted steers had higher marbling scores than controls, but no differences existed between once and twice-implanted steers.

Introduction

Hormone implants are widely recognized as products that increase lean tissue gain and profitability in the feedlot phase. Varying combinations of implants in many experiments have been examined to find maximum response for various classes of cattle. In this demonstration, we utilized mixed yearling steers (Simmental, Simmental x, Charolais x, Shorthorn, Angus, and Angus x) to measure the feedlot performance and carcass characteristics of two different implant strategies. These cattle were purchased at a southern Iowa auction market and backgrounded on grass for 108 days. At trial initiation, a low-level estrogen implant was administered on day one followed by an estrogen/TBA implant on d 57 of the feeding period. This was compared with an estrogen/TBA implant administered on day 0. We also monitored fat thickness at the 12th/13th rib and ribeye depth via real-time ultrasound at approximate 28 d intervals to assist us in ascertaining market readiness and in measuring lean tissue accretion and fat deposition.

Methods and Materials

Seventy-five mixed steers from the Adams County CRP Research project were allotted by weight and breed type to three different groups (Control, no implant = C; Double Implanted = DI, Component® EC + Component® TES; and Single Implanted = SI, Component® TES) and fed at the ISU Allee Demonstration Farm near Newell, Iowa. Each group was fed in concrete pens with concrete feed bunks, and had wind protection from the north and fresh water available at all times. Free choice salt was also available. On day 0, the DI group received Component® EC, and on day 57 DI steers were re-implanted with Component® TES. On day 0, the SI group received Component® TES. Implants were administered subcutaneously in the middle third of the animal's left ear.

The cattle were fed a 50:50 forage:concentrate diet and were stepped up to an 80% concentrate diet (NE_g = 64.35 Mcal/cwt) by day 21. The diet consisted of shelled corn, corn silage, alfalfa hay, soybean meal, and a commercial protein supplement containing lasalocid to provide 250 mg per head per day. The cattle were fed twice daily. One steer died due to apparent heat stress two days after trial initiation.

Cattle were weighed (full weights) and real-time ultrasound data were collected (fat thickness at the 12th/13th rib, loin eye depth, and % marbling in the rib eye) at approximately 28 d intervals -- September 3, October 2, October 30, November 27, and December 18. The only exception was that the final period was 21 days, for a total trial length of 106 days. Cattle were harvested at a commercial beef packing plant in Denison, Iowa, on December 21, and carcass data were collected on December 22. One steer carcass was condemned for Nephritis Pyelitis (kidney infection).

Results and Discussion

In our demonstration, implanted steers had significantly ($P \leq 0.05$) heavier market weights and higher average daily gains. Feed conversions (pounds of dry matter fed per pound of live gain) were not significantly different among treatments, however SI steers tended ($P=0.08$) to convert more efficiently. There was no measurable response in weight gain to the first implant in DI steers the first 57 days of the demonstration when compared with control steers.

Via real-time ultrasound data, implanted steers had greater loin eye depth than controls ($P \leq 0.05$). Additionally, implanted steers had larger rib eye areas at slaughter, and heavier hot carcass weights than control steers ($P \leq 0.05$). There was no effect on calculated yield grade, dressing percentage, marbling score via ultrasound, or fat cover at the 12th/13th rib via ultrasound or by actual carcass measurements. DI steers had higher marbling scores than controls as called by the USDA grader ($P \leq 0.05$); however, there was no significant difference between control and SI steers. In some studies, the use of TBA has tended to decrease quality grades, but this did not occur in our study.

Note the ultrasound data recorded per feeding period in Tables 5, 6, and 7. Ultrasound data for fat cover four days prior to carcass data collection were very similar for pen averages when compared with actual carcass data. No analysis of individual animal ultrasound data from the final weigh date and actual carcass data was made, nor was a correlation developed between loin eye depth via ultrasound versus actual rib eye area from actual carcass measurements. Also, it is difficult to explain the apparent "shrinkage" of loin eye depth measurement in the SI steers between the 10/30 scan date and the 11/27 date. It may be due to operator error, software inaccuracy, or some biological event that cannot be explained here. It is important to note, however, that loin eye depth in the implanted cattle was 7% greater at the final measurement, which closely corresponds with the 5% rib eye area taken from carcass measurements.

Although cattle were allotted to treatment only by weight and breed type, preliminary ultrasound data showed no differences in fat cover and marbling percentage at the initiation of the demonstration. DI steers had greater rib eye depth than controls on day 0, but there was no difference between controls and SI steers, or between DI and SI steers.

This demonstration provided only one pen per treatment, 25 head per pen, so readers should take into account the possibility that a "pen effect" may exist. Full weights were measured rather than 12 or 24 hour "shrunk" weights. The reasoning for this was that the cattle had mistakenly been fed prior to the first weight so the authors continued to record full weights throughout the demonstration for consistency. One steer in the control group died two days after the demonstration began due to hot weather, and one carcass in the control group was condemned for Nephritis Pyelitis (kidney infection).

Acknowledgments

Appreciation is expressed to Lyle Rossiter of the Allee Demonstration Farm for his role in feeding and managing the cattle in the demonstration and to the Iowa Beef Center for partial funding of the project. Appreciation is also expressed to Vet Life/Ivy Labs for providing the implants for this study. Component® EC and Component® TES are registered trademarks of Ivy Laboratories, Overland Park, Kansas.

Table 1. Feedlot performance of steers subjected to different implant strategies.

Treatment	Beginning Weight	Ending Weight	Average Daily Gain	Feed:Gain
Control	858[a]	1171[a]	2.90[a]	8.35[a]
Double Implanted	847[a]	1212[b]	3.44[b]	7.52[a]
Single Implanted	855[a]	1236[b]	3.59[b]	7.35[a]

[a,b]Means within a column with unlike superscripts differ ($P \leq 0.05$)

Table 2. Carcass characteristics of steers subjected to different implant strategies.

Treatment	HCW (lbs)	Dress %	Fat Cover	REA (sq.in.)	KPH %	Yield Grade (Calculated)	Marbling Score*
Control	714[a]	60.5[a]	.26[a]	11.93[a]	1.76[a]	2.1[a]	1001[a]
Double Implanted	739[b]	61.0[a]	.25[a]	12.60[b]	1.88[ab]	1.9[a]	1028[b]
Single Implanted	751[b]	60.8[a]	.26[a]	12.51[b]	1.92[b]	1.9[a]	1016[ab]

[a,b]Means within a column with unlike superscripts differ ($P \leq 0.05$)
(Note: Dressing % figure is the hot carcass weight divided by the full live weights on 12/18/98)
*1000 = Small^{0} or Choice-; 1010 = Sm^{10}, etc.

Table 3. Live steer weights by feeding period.

Treatment	9/3	10/2	10/30	11/27	12/18
Control	858^{a}	923^{a}	1022^{a}	1136^{a}	1171^{a}
DI	847^{a}	912^{a}	1016^{a}	1152^{ab}	1212^{b}
SI	855^{a}	953^{b}	1075^{b}	1178^{b}	1236^{b}

^{a,b}Means within a column with unlike superscripts differ ($P \leq 0.05$).

Table 4. Steer average daily gains for each feeding period (not cumulative).

		Period ending:		
Treatment	10/2	10/30	11/27	12/18
Control	2.47^{a}	3.55^{a}	3.98^{a}	1.62^{a}
DI	2.23^{a}	3.73^{a}	4.85^{b}	2.88^{b}
SI	3.36^{b}	4.36^{b}	3.85^{a}	2.73^{b}

^{a,b}Means within a column with unlike superscripts differ ($P \leq 0.05$).

Table 5. Real-time ultrasound fat cover (in inches) by period.

Treatment	9/3	10/2	10/30	11/27	12/18
Control	0.037^{a}	0.062^{a}	0.12^{a}	0.19^{a}	0.24^{a}
DI	0.038^{a}	0.062^{a}	0.12^{a}	0.18^{a}	0.22^{a}
SI	0.035^{a}	0.067^{a}	0.13^{a}	0.20^{a}	0.26^{a}

^{ab}Means within a column with unlike superscripts differ ($P \leq 0.05$).

Table 6. Percent marbling via real-time ultrasound by feeding period.

Treatment	9/3	10/2	10/30	11/27	12/18
Control	4.11^{a}	4.26^{a}	4.53^{a}	4.86^{a}	4.87^{a}
DI	4.24^{a}	4.51^{b}	4.76^{b}	4.91^{a}	5.00^{a}
SI	4.10^{a}	4.40^{ab}	4.83^{b}	4.87^{a}	4.97^{a}

^{a,b}Means within a column with unlike superscripts differ ($P \leq 0.05$).
4.00 = Small ^{0} marbling score.

Table 7. Real-time ultrasound rib eye depth (in inches) by feeding period.

Treatment	9/3	10/2	10/30	11/27	12/18
Control	1.92	2.06	2.14	2.10	2.10
DI	2.05	2.15	2.15	2.25	2.25
SI	2.01	2.18	2.34	2.19	2.26

^{a,b}Means within a column with unlike superscripts differ ($P \leq 0.05$)