

Economics of implant strategies at reimplant time
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Introduction

Thirty years ago research at this center showed that reimplanting feedlot cattle increased gains and also indicated that this extra implant application also adversely affected carcass quality grade. Because of the preponderance of grid pricing and the increase in premiums for USDA Choice and higher grading carcasses, there is substantial concern that the tradeoff of extra gain for lower grade may negate the benefits of reimplanting.

Cattle may be evaluated and clustered into marketing groups at reimplant time. This provides both the opportunity and the challenge to develop economic and performance models to aid in decisions of whether or not to implant and a choice among implants differing in potency. In the research presented here, mere qualitative responses are not of interest. The objective is to estimate quantitative effects as precisely as possible in order to fit parameters to an economic decision model.

Some of factors that might affect implant strategy include the price differential among quality grades, e.g., the Choice – Select spread, along with knowledge of the effect of the various implant selections on carcass grade. Also, it is necessary to know the amount of weight gain response from different implants in order to judge the trade off between reduced grade and increased gain. The value of the improved performance from implanting will also be affected by feed costs. When cattle are clustered at reimplanting time there will be variations in the time interval until harvest date which will vary from groups projected to be marketed in as little as 40 days and as long as over 100 days. Assignment of individual animals to these different outcome groups may affect implant decisions.

Ultrasound provides a technology to estimate marbling at implant time. An objective of this research was to determine if implant effects might differ according to the marbling potential of individuals. In particular, if the ultrasound evaluation indicated that an animal had potential to grade well, would reimplanting have as much adverse effect on future quality grade as it would on a more mediocre individual (or vice versa)?

Materials and Methods

This report includes results from 850 steers used in six replications with 5 pens of about 28 animals per pen. The experiment lasted from reimplanting until harvest with an average duration of 71 days. Native yearling steers that were predominately Angus were used in this study. Previous implant history is unknown but most probably had at least one implant between weaning and arrival. They averaged 1141 pounds at reimplant time and 1364 at the end of the trials. Prior to allotment, each animal was evaluated with ultrasound to obtain initial backfat and marbling. Initial weights were taken after an overnight shrink. Average daily gains were calculated for a final weight generated from

dividing carcass weight by 0.64. Cattle were fed a high energy diet that was primarily rolled milo.

All cattle had been implanted with Synovex Choice upon arrival, about 80 days before the beginning of the trials. Synovex Choice contains 100 mg trenbolone acetate and 14 mg estradiol which is half the dose of Synovex Plus. Implants for this research were provided by Fort Dodge Laboratories, Overland Park, Kansas.

The five experimental treatments were:

1. Control (No Implant)
2. Synovex Choice 70 days before harvest (Choice 70)
3. Synovex Choice 40 days before harvest (Choice 40)
4. Synovex Plus 70 days before harvest (Plus 70)
5. Synovex Plus 40 days before harvest (Plus 40)

The 70-day treatments were implanted when the cattle were initially allotted for the study; the 40 -day treatments were implanted 30 days later and all cattle were harvested at the same time. The purpose of the 40-day treatment was to mimic cattle that might be projected to be marketed that soon after reimplanting. Because of variability in scheduling for harvest, actual duration of these trials averaged 71 days. Cattle were harvested in commercial packing plants and carcass data collected by an experienced person. Rib eye area and calculated yield grade were obtained only from the last four replications.

Least squares means for the variables of interest were obtained within each replication with a model that included cattle source, initial weight and initial ultrasound estimates of marbling, backfat thickness and muscle depth. Then these means were analyzed as a 6 (replication) by 5 (treatment) analysis of variance so that pen within replication was the experimental unit. Treatment variance was partitioned into the following orthogonal contrasts: Control versus implant treatments, Synovex Choice versus Synovex Plus, implanting 40 d versus 70 d pre-slaughter, and the interaction of implant and days pre-slaughter.

Results

Results for each treatment are presented in Table 1. Table 2 shows the contrasts of interest (none of the interactions of implant treatment and days pre-slaughter were significant and consequently, not reported.).

Cattle that were reimplanted averaged 3.60 pounds per day gain during the 71-d experimental period compared to 3.20 for the control cattle that were not reimplanted ($p < 0.0001$). Cattle reimplanted with the more aggressive implant (Synovex Plus) averaged 0.14 pounds per day more than those that received Synovex Choice ($p < 0.02$). Cattle implanted 70 days before slaughter gained slightly faster than those implanted 40 days before harvest (3.66 vs. 3.53 lb per day, $p < .03$). Note that the gains for the 40-d

cattle are for the entire 71-period including the 30 days before they were implanted. These results indicate that most the response to reimplanting occurs within 40 days.

Implanting adversely affected carcass quality grade whether expressed as marbling score, percent Choice or percent Premium Choice (Average Choice or higher). But, there was no significant difference when Plus or Choice or implanting 70 or 40 days pre-slaughter were compared. (The scale for marbling score in Tables 1 and 2 is Slight amount = 4.00 – 4.99 and Small amount – 5.00 – 5.99.)

Carcass backfat thickness was slightly higher among the non implanted cattle ($p < 0.12$) and cattle implanted 70 days pre slaughter had slightly more backfat than the 40-d treatments ($p < 0.08$). Implanted cattle had larger carcass rib eye area (14.66 vs. 14.15 square inches, $p < 0.03$). This resulted in a significant improvement in calculated yield grade among the reimplant treatments (3.00 vs. 3.22, $p < 0.02$). There was a tendency for cattle implanted with Synovex Plus to have a better yield grade than those implanted with Synovex Choice ($p < 0.11$). Of the 0.51 square inch increase in rib eye area among reimplanted cattle, 41 percent could be attributed to increases in carcass weight and 59 percent to direct stimulation of muscle growth from implanting.

Dressing percent was higher among implanted cattle ($p < 0.08$). However, this effect was removed in calculating average daily gain by adjusting final weights to a constant dressing percent of 64.

Ultrasound was effective in predicting carcass quality and sorting cattle into groups according to marbling potential. The correlation between initial ultrasound marbling and final carcass marbling was 0.65. Reductions in carcass quality grade from implanting occurred among low, medium and high marbling potential cattle (Table 3). The reduction in percent Choice was more apparent among cattle with low and medium marbling potential. Among cattle with high marbling potential, the reduction in percent Premium Choice appeared more important than the reduction in percent Choice. Chi square analysis indicated that there was no interaction between the quality grade reduction from implanting and marbling potential group. These results indicate that estimates of marbling potential with ultrasound probably will not affect implanting decisions.

There was virtually no difference in feed intake among treatments. Consequently, feed efficiency averaged 13 percent better among implanted cattle ($p < 0.0004$)

In Table 4 the economics of the gain response to reimplanting is registered with the discount from the reduction in quality grade. The results indicate greater profitability from using the more aggressive implant, Synovex Plus, for both cattle that are 40 and 70 days in front of slaughter. Among cattle that were 70 days away from slaughter, reimplanting with Synovex Plus appeared to be profitable unless the Choice/Select spread exceeded \$22. Only if the Choice/Select spread exceed \$11 was it desirable to forgo reimplanting cattle that were only 40 days away from slaughter.

Yield grades were better among implanted cattle but most carcass price grids provide little extra premium for cattle with better yield grades. However, their less desirable yield grade indicates that it would not be a feasible strategy to feed the non implanted cattle longer to attempt to recover their lower weight gain. In fact the lower yield grades of cattle in the implant treatments could be fed more days, as shown in Table 4, to attain the same yield grade as the control group. This extra gain increases feedlot profits, especially when the feeding margin (difference between selling price and cost of gain) is wide. As shown in Table 4, an astute manager might exploit this to add another \$8 to \$18 to per head profit by reimplanting.

Conclusions:

- The economic importance of extra gain from reimplanting in relation to reduction in quality grade was greater than expected.
- The adverse effect of implanting on grade prevailed among both cattle with high and low marbling potential
- There were similar results from implanting 40 or 70 days before harvest. This suggests that most of the implant response occurs within 40 days.
- Gain response to Synovex Plus was greater than Synovex Choice and these results indicate the more aggressive implant results in greater profitability.
- Reimplanting resulted in better yield grade, primarily because rib eye area was larger. This could be exploited to feed cattle longer to obtain more feedlot gain, thus increasing profitability.

Table 1. Response to moderate or aggressive implants given 40 or 70 days pre-slaughter.

Implant	Control	Choice	Choice	Plus	Plus
Days pre-harvest		70	40	70	40
Number of Head	161	167	176	175	171
Initial weight	1141.77	1139.79	1140.57	1144.91	1140.41
Final weight	1351.87	1371.65	1359.68	1373.63	1365.45
Dressing percent	64.65%	65.06%	65.26%	65.33%	65.38%
Carcass weight	877.19	895.27	888.40	900.02	895.39
Average daily gain	3.20	3.61	3.45	3.72	3.62
Dm Intake	26.29	26.20	26.39	26.17	25.89
Lb gain/ cwt DM	12.16	13.78	13.08	14.22	13.97
Carcass attributes					
Marbling score	5.53	5.13	5.24	5.27	5.18
Percent Choice	77.23%	61.44%	63.58%	64.15%	59.32%
Percent Premium Choice	30.01%	12.26%	13.30%	14.37%	12.42%
Backfat, in	0.47	0.47	0.45	0.46	0.44
Rib eye area, sq in	14.15	14.64	14.48	14.94	14.59
Percent KHP fat	2.37	2.33	2.32	2.23	2.30
Calculated yield grade	3.22	3.08	3.06	2.90	2.98

Table 2. Means and significance of contrasts (control vs. implant, Choice vs. Plus, and 40 d vs. 70 d pre-slaughter).

Contrast	Control	Implant	p value	Choice	Plus	p value	40-days	70-days	p value
Dressing percent	64.65%	65.33%	0.0787	65.16%	65.50%	NS	65.32%	65.35%	NS
Carcass weight	877.19	894.77	0.0000	891.84	897.70	0.0174	891.90	897.64	0.0196
Average daily gain	3.20	3.60	0.0000	3.53	3.67	0.0203	3.53	3.66	0.0269
Dm Intake	26.29	26.16	NS	26.29	26.03	NS	26.14	26.19	NS
Lb gain/ cwt DM	12.16	13.76	0.0000	13.43	14.10	0.0245	13.52	14.00	0.0976
Carcass attributes									
Marbling score	5.53	5.20	0.0001	5.19	5.22	NS	5.21	5.20	NS
Percent Choice	77.23%	62.12%	0.0005	62.51%	61.73%	NS	61.45%	62.79%	NS
Percent Premium Ch	30.01%	13.09%	0.0000	12.78%	13.40%	NS	12.86%	13.32%	NS
Backfat, in	0.47	0.46	0.1150	0.46	0.45	NS	0.45	0.46	0.0744
Rib eye area, sq in	14.15	14.66	0.0275	14.56	14.77	NS	14.53	14.79	NS
Percent KHP fat	2.37%	2.30%	NS	2.33%	2.27%	NS	2.31%	2.28%	NS
Calculated yield grade	3.22	3.00	0.0216	3.07	2.94	0.1132	3.02	2.99	NS

Table 3. Effect of implant treatment on marbling by marbling potential indicated from initial ultrasound estimate.

Implant	Control	Choice	Choice	Plus	Plus	Overall	Implant
Days pre-harvest		70	40	70	40	Average	Average
Low marbling potential							
% Choice	53.06%	25.00%	39.66%	25.81%	25.42%	33.21%	28.97%
%Premium Choice	6.12%	5.77%	3.45%	3.23%	1.69%	3.93%	3.53%
Medium marbling potential							
% Choice	80.00%	71.67%	64.00%	53.19%	61.40%	67.03%	62.57%
%Premium Choice	30.77%	13.33%	14.00%	12.77%	14.04%	17.56%	13.53%
High marbling potential							
% Choice	88.89%	77.36%	83.33%	79.37%	87.27%	82.98%	81.83%
Premium Choice	66.67%	45.28%	42.42%	52.38%	52.73%	51.06%	48.20%

Table 4. Economic analysis of treatment responses.

Implant	Control	Choice	Choice	Plus	Plus
Days pre-harvest		70	40	70	40
Additional gain		29.34	18.16	37.02	29.85
Value of gain @\$90/cwt		\$26.40	\$16.35	\$33.32	\$26.86
Percent Choice	77.23%	61.44%	63.58%	64.15%	59.32%
Percent premium Choice	30.01%	12.26%	13.30%	14.37%	12.42%
Choice discount @\$10/cwt		(\$14.14)	(\$12.13)	(\$11.78)	(\$16.04)
Premium Choice discount @\$5/cwt		(\$7.94)	(\$7.42)	(\$7.03)	(\$7.87)
Net of premium and discounts		\$4.32	(\$3.20)	\$14.51	\$2.95
Breakeven Choice/Select spread		\$13	\$8	\$22	\$11
Calculated yield grade	3.22	3.08	3.06	2.90	2.98
Days to YG 3.22 (control)		7	8	15	12
Value of extra days					
Feeding margin = \$40/cwt		\$8.4	\$9.6	\$18.0	\$14.4
Feeding margin = \$20/cwt		\$4.2	\$4.8	\$9.0	\$7.2