1992

Implant Combinations and Reimplanting Strategies for Yearling Steers Fed High Concentrate Diets

R. H. Pritchard
South Dakota State University

M. A. Robbins
South Dakota State University

D. H. Gee
South Dakota State University

IMPLANT COMBINATIONS AND REIMPLANTING STRATEGIES FOR YEARLING STEERS FED HIGH CONCENTRATE DIETS

R.H. Pritchard,[1] M.A. Robbins,[2] and D.H. Gee[3]
Department of Animal and Range Sciences
CATTLE 92-7

Summary

Crossbred yearling steers were used to determine the relative efficacy of specific anabolic implant combinations and sequences on feedlot performance and carcass traits. Steers were fed a high concentrate finishing diet for 112 days. Implanting was done on days 1 and 42 of the feeding period. Implanting improved ($P<.05$) average daily gain (ADG) 22% and feed efficiency 15%. Implant treatment generally increased dry matter intake. Implanting increased ($P<.05$) the rib eye area of carcasses 6.5% and tended to cause a reduction in percentage choice carcasses. The percentage of abscessed implants ranged from <1% to 10%, depending on the type of implant used even though implant needles were disinfected between each use.

(Key Words: Implants, Steers, Feedlot.)

Introduction

The additive effects of trenbolone acetate and estradiol based implants have created many options for implanting feedlot cattle. The combination, sequences, and timing of implant use that produce optimum results are unclear. The implant strategies that will maximize performance will significantly reduce quality grades of beef carcasses. Carcass quality grade is highest in nonimplanted cattle, but production efficiencies are low.

We know that reimplant programs improve gains over a 120-day feeding period. There is also substantial evidence that implanting within 60 days of slaughter lowers quality grades. As a compromise between these two concerns, it may be beneficial to reimplant 120-day cattle after 40 days on feed. The general classes of implants available to use in these situations are estradiol, zeralonone and trenbolone acetate. This study was designed to determine whether specific implant combinations and sequences of use would be more suitable as an optimum program in yearling steers.

Materials and Methods

Crossbred yearling steers (262 head) were assembled during late April and May of 1991. As groups of steers arrived, they were ear tagged and treated for parasites with Levamisole[4] and XPAR[4] according to label directions. The receiving diet was 50% wheat straw and 50% ground hay. A pelleted protein supplement (44% crude protein) containing 9,900 IU vitamin A per pound was fed at a rate of 1 lb per head per day.

Initial weights were taken on two consecutive days. Intake was restricted to 10 lb of receiving diet, and water was withheld after 5 p.m. the day before each initial weight determination. Allotment to pen and treatment was based on the first weight taken such that breed type and weight were balanced across 30 pens of 8 head each. Implants were administered when the second initial weight was measured.

An abrupt switch to the finishing diet (Table 1) occurred on the day of the second initial weight determination. During the first week, dry matter intake

[1]Associate Professor.
[2]Former Manager, Beef Cattle and Sheep Nutrition Unit.
[3]Professor.
[4]IMC, Pitman-Moore, Mundelein, IL.

Table 1. Finishing diets

Item	Percentage[a]
Hay	10.00
Whole shelled corn[b]	41.34
High moisture corn	41.34
Liquid supplement[c]	3.59
Soybean meal, 44%[d]	3.28
Calcium carbonate	.18
Potassium chloride	.27

[a] Percentage dry matter basis.
[b] Decreased to 40.340% after 77 days.
[c] Contained the following (DMB) DM 70%, CP 28.5%, Ca 10.1%, P 1.0%, K 4.4%, NaCl 11.15%, vitamin A 51,865 IU/lb, vitamin D 12,965 IU/lb, vitamin E 27 IU/lb, and monensin 730 g/T.
[d] Increased to 4.28% after 77 days.

was started at 14.4 pounds per head per day which is slightly above maintenance. Intake was increased every third day until cattle were fed to appetite. Appetite was established based on morning bunk conditions. Steers were fed once daily starting at 7 a.m. except on weigh days, when feeding started at 9 a.m.

Implant treatments each applied to five pens (40 head) included the following:

Treatment	Day 0	Day 42
1	0	0
2	Synovex-S[5]	Synovex-S + Finaplix-S[6]
3	36 mg Ralgro[4]	Synovex-S + Finaplix-S
4	36 mg Ralgro	36 mg Ralgro + Finaplix-S
5	36 mg Ralgro	72 mg Ralgro + Finaplix-S
6	72 mg Ralgro	72 mg Ralgro + Finaplix-S

Implant integrity was determined 28 days after each implanting. Exudative implant sites were exposed and swabbed for microbial culture. Culture work was done by Dr. D. W. Miskimmins of the SDSU Animal Disease and Diagnostic Laboratory. Implant sites were scored as 0 = no reaction, 1 = some firm swelling, 2 = warm, swollen, soft, 3 = draining abscess, and 4 = scarring or other evidence of previous drainage.

Feed deliveries were monitored daily. Diet ingredients were subjected to chemical analysis weekly. The crude protein content of corn and hay declined during the course of the study. To raise dietary crude protein, soybean meal (1%) was substituted for an equal amount of dietary dry whole shelled corn. Diet composition prior to and after 78 days is shown in Table 2.

Table 2. Diet analysis[a]

Item	Days 1 to 77	Days 78 to 112
Dry matter, %	83.7 $\pm$ .22	81.0 $\pm$ .10
Crude protein, %	11.5 $\pm$ .19	11.6 $\pm$ .08
NDF, %	14.8 $\pm$ .08	15.5 $\pm$ .05
ADF, %	6.6 $\pm$ .09	7.1 $\pm$ .07
Ash, %	3.4 $\pm$ .09	3.2 $\pm$ .07

[a] All values except dry matter on DM basis.

[5] Syntex Corporation, Des Moines, IA.
[6] Hoechst Roussel, Somerville, NJ.

Steers were weighed in the morning after 28, 42, 98, 111, and 112 days on feed. Water was withheld for 12 hours prior to weighing on day 42. Intake was restricted to 50% of ad libitum and water was withheld for 12 hours the day prior to the 111- and 112-day weights. These weights (days 111 and 112) were used as final weights.

After the day 112 weights, steers were fed similarly to the previous 2 days. After feed was cleaned up, steers were shipped 70 miles to IBP, Luverne, MN, where they stood overnight with access to water. Overall transit shrink was 2.6% of final weights and was used to calculate cumulative performance data. Steers were slaughtered the next morning after shipment. Hot carcass weight was recorded. Twenty-four hours after slaughter, carcasses were available for grading. Rib eye area and rib fat were measured. The federal grader on duty estimated percent kidney, pelvic and heart fat and identified marbling to the nearest one-third marbling score. One grader made all subjective estimates. Carcasses were presented to the grader in a completely random sequence.

The data were statistically evaluated using procedures for a completely random design. Mean separations were accomplished using Duncan's New Multiple Range Test as an option in the GLM procedure of SAS. Percentage choice data were tested by Chi square analysis. No specific treatment contrasts for percentage choice were made. One individual was identified as a heifer and removed form the study on day 2. Two carcasses were missed during measurements of rib fat thickness and rib eye area. The experimental units for feedlot performance and carcass data were pen means and individual carcasses, respectively.

Results and Discussion

The original intent was to evaluate implant combinations and reimplant programs for steers requiring 120 days on feed. The excellent steer performance caused us to reduce time on feed to 112 days. Implanting increased ($P<.001$) cumulative ADG over controls by 22% (Table 3). Among groups receiving implants, the variation in cumulative ADG was only 5% from lowest to highest mean value. No differences in ADG were detected.

Some treatment differences in steer performance occurred that cannot be explained. These differences occurred between treatments 3, 4, and 5 which all received the same implant treatment during the initial 42-day feeding period. Through 42 days, steers in treatment 5 had lower ADG than steers in treatments 3 and 4, although they were treated similarly. Gain during the following 70 days was similar among all implanted groups. Reviewing individual steer performance, there were no obvious problems to explain this response. Steers on treatment 4 tended to consume more feed than steers on treatments 3 and 5 in each phase of the study.

Carcass weights and fat thicknesses were appropriate for today's market standards (Table 4). Implanting increased ($P<.001$) carcass weight. Fat thickness differed ($P<.05$) among treatments, but no relationship to implants used could be identified. Rib eye area increased ($P<.001$) with implanting as would be expected. Marbling scores were lower ($P<.05$) for treatment 5 which was the group that tended to have lower ADG. The 62.5% choice for control cattle is typical for the mixed, colored steers used in this study. Chi square analysis indicated no differences in percentage choice due to implanting, but all implanted groups had numerically fewer choice cattle than the controls. There was an 70-day time span from last implanting to slaughter and still a 10 point decline in percentage choice carcasses in implanted treatments was observed. This reduction in percentage choice has been consistent across our studies in recent years.

The incidence of abnormal implant sites is noted in Table 5. These data should be reviewed with the knowledge that implant needles were disinfected between each use. Chi square analysis indicates that there were treatment effects at day 28 ($P<.10$) and day 70 ($P<.05$), although the high frequency of zero observations may make the test invalid. There was a 10% abscess rate for Finaplix-S and 5% for 72 mg Ralgro implants. Synovex and 36 mg Ralgro abscess problems were nominal. Cultures were obtainable from Synovex and Finaplix implant sites. *Actinomyces pyrogenes* was the most commonly identified organism in these sites (Table 6).

Table 3. Feedlot performance responses to implant treatments

Treatment	1	2	3	4	5	6	
Day 0 implant	Control	SYN	36 mg	36 mg	36 mg	72 mg	
Day 42 implant	Control	SYN/FIN	SYN/FIN	36/FIN	72/FIN	72/FIN	SEM
Initial weight	742	741	744	744	745	741	2.1
Day 1 to 42							
Weight (day 42)	901^{a}	904^{ab}	917^{ab}	924^{b}	898^{a}	909^{ab}	6.1
ADG	3.80^{ab}	3.88^{abc}	4.13^{bc}	4.27^{c}	3.65^{a}	4.01^{abc}	.138
DMI	18.75^{ab}	18.24^{a}	18.90^{ab}	19.55^{b}	18.25^{a}	18.72^{ab}	.340
F/G	4.94^{ab}	4.73^{ab}	4.59^{a}	4.58^{a}	5.04^{b}	4.68^{ab}	.116
Day 43 to 112							
Weight (day 112)	1106^{a}	1181^{b}	1193^{b}	1192^{b}	1172^{b}	1185^{b}	9.6
ADG	2.56^{a}	3.46^{b}	3.44^{b}	3.35^{b}	3.42^{b}	3.45^{b}	.120
DMI	21.24^{a}	22.39^{b}	22.48^{bc}	23.44^{c}	22.56^{bc}	22.52^{bc}	.309
F/G	8.33^{a}	6.49^{b}	6.56^{b}	7.00^{b}	6.63^{b}	6.56^{b}	.210
Day 1 to 112							
Weight[a]	1077^{a}	1151^{b}	1162^{b}	1161^{b}	1141^{b}	1154^{b}	9.4
ADG	3.00^{a}	3.65^{b}	3.73^{b}	3.72^{b}	3.54^{b}	3.69^{b}	.086
DMI	22.20^{a}	22.83^{ab}	23.14^{b}	24.07^{c}	22.96^{ab}	23.11^{b}	.259
F/G	7.42^{a}	6.27^{b}	6.22^{b}	6.47^{b}	6.49^{b}	6.27^{b}	.134

[a] Based on 2.6% final weight shrink.
[b,c] Means without common superscripts differ ($P<.05$).

Table 4. Effect of implant treatment on carcass traits

Treatment	1	2	3	4	5	6	SEM
Carcass wt, lb	672^{b}	715^{c}	727^{c}	724^{c}	713^{c}	719^{c}	7.69
Dressing percent	62.5	62.2	62.6	62.4	62.5	62.3	.214
Rib fat, in.	.46^{bc}	.43^{bc}	.40^{b}	.45^{bc}	.40^{b}	.48^{c}	.022
Rib eye area, in.^{2}	11.84^{b}	12.54^{c}	12.87^{c}	12.45^{c}	12.87^{c}	12.33^{bc}	.178
KPH	1.80	1.65	1.63	1.68	1.63	1.71	.070
Yield grade	2.77^{b}	2.61^{bc}	2.46^{c}	2.74^{b}	2.42^{c}	2.82^{b}	.091
Marbling score[a]	4.75^{c}	4.50^{bc}	4.44^{bc}	4.56^{bc}	4.35^{b}	4.50^{bc}	.109
Choice, %	62.5	47.5	50.0	52.5	45.0	53.9	

[a] 4.00 = Slight^{o}, 5.00 = Small^{o}.
[b,c] Means without common superscripts differ ($P<.05$).
[d] Increased to 4.28% after 77 days.

Table 5. Implant score frequencies by type of implant[a]

	Implant			
Score	35 mg Ralgro	72 mg Ralgro	Synovex-S	Finaplix-S
Day 28				
0	119	36	38	-
1	0	1	0	-
2	1	2	0	-
3	0	0	0	-
4	0	0	2	-
Day 70				
0	40	74	79	178
1	0	4	0	17
2	0	0	1	3
3	0	0	0	0
4	0	0	0	0

[a] One steer in treatment 5, 72 mg + Finaplix, was diagnosed as unimplanted at day 70.

Table 6. Microbial cultures of infected implant sites

Calf	Implant	Organism
557	Finaplix-S	*Actinomyces pyrogenes*
442	Finaplix-S	*Actinomyces pyrogenes*
662	Finaplix-S	α *hemolytic streptococci*
570	Synovex-S	*Actinomyces pyrogenes*
579	Synovex-S	*Actinomyces pyrogenes*
540	Synovex-S	*Staphylococcus aureus*

No definitive differences between implant combinations and reimplanting strategies were evident from these data. Each implant treatment used lowered production costs compared to feeding nonimplanted cattle. We have known for many years that implants reduce marbling in beef carcasses and that response appears in this data set. Larger data sets will be necessary to determine if specific implant strategies will have a lesser negative effect on carcass quality than other strategies.