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Effect of Winter Grazing Implant on Carcass Characteristics

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Story in Brief

Three hundred crossbred steers that previously received either no implant (Control), or were implanted with Synovex-C®, Synovex-S® or Revalor-G® during the dry-winter grazing phase were used to determine the effects of dry-winter implants on carcass characteristics. Following winter grazing, all steers were reimplanted with Ralgro® and grazed a common tallgrass prairie summer pasture from March 29 to July 17 (110 d). Steers were then implanted with Revalor-S®, placed in the feedlot, and harvested November 17, 1997 after a 123-d finishing period with individual carcass data collected. Steers implanted during the dry-wintering phase had more advanced skeletal and overall maturity scores compared with Control steers. Control steers tended to have higher yielding carcasses. There were no differences in marbling between implanted and non-implanted steers. The results of this trial indicate that an additional implant during the dry-wintering phase increased carcass weights, despite similar management during the interim summer grazing and feedlot phases; however, the benefits of increased weight gain may be offset by decreased quality grade due to advanced carcass maturity.

(Key Words: Growing Steers, Implants, Carcass Traits.)

Introduction

We previously reported that daily gains of steers in a dry-winter grazing program implanted with Synovex-C®, Synovex-S® and Revalor-G® were increased compared with non-implanted steers, despite having gains below 1.0 lb/d (Paisley et al., 1997). The increased weight gain of implanted steers resulted in increased gross returns ranging from $11.74 to $20.97/steer over Control steers. While implanting steers during the dry-wintering phase may improve weight gain, the effects of implanting on carcass characteristics may be important to producers interested in retaining ownership and selling on a carcass basis. The objective of this study was to determine the effects of an additional estrogenic and combination implant during the dry-winter grazing phase on carcass characteristics, including hot carcass weight, yield grade, marbling score, and overall carcass maturity.

Materials and Methods

Animals. Three hundred crossbred steers (initial wt 406 ± 56 lb) owned by Sooner Cattle Company and DCC Stocker Feeder (Pawhuska, OK) were transported from Deseret Cattle Operations in central Florida to the Little Chief Ranch, located in north central Oklahoma near Fairfax, and received either no implant (Control) or were implanted with Synovex-C®, Synovex-S® or Revalor-G® implants resulting in 75 steers per treatment. Management and performance of steers during the winter grazing period are described by Paisley et al., (1997). Following completion of the winter grazing period, all steers were implanted with Ralgro® and placed on summer tallgrass prairie from March 29 to July 17, 1997 (110 d). After the conclusion of the summer grazing period, steers were shipped to Supreme Cattle Feeders in Liberal, KS. They were implanted with Revalor-S® and were not re-implanted during the 123-d feedlot period. Performance of the steers during the summer grazing and feedlot phase is described in a companion paper in this publication (Paisley et al. 1998).

Carcass Data. Steers were slaughtered at National Beef on November 19, 1997 with university personnel collecting individual carcass data. On the slaughter floor, individual steers were identified by ear tag prior to removal of hide and each steer was subsequently labeled with sequential tags placed in the brisket area using shroud pins. Corresponding plant identification numbers for each carcass were also recorded prior to its leaving the slaughter floor. Carcasses

were chilled for approximately 31 h and railed off separately in the cooler immediately following USDA grading. University personnel estimated percent KPH fat, marbling scores, skeletal and lean maturity (USDA, 1997), recorded carcass weight, and measured external fat thickness and ribeye area for all carcasses. Recorded measurements were then used to calculate yield grade and overall maturity score, as well as determine quality grade.

Data Analysis. Carcass characteristics were analyzed using least squares analysis as a randomized complete block design (SAS, 1990) with feedlot pen used as a blocking factor to adjust for pen differences in feedlot performance and their effect on carcass characteristics. Treatment sums of squares were separated using non-orthogonal contrasts that compared Control vs implanted, Revalor-G® vs Synovex-C® (i.e., similar amounts of estrogenic activity) and Revalor-G® vs Synovex-S® to make direct comparisons of implant effects on carcass characteristics.

Carcass Value Analysis. The Oklahoma State University Boxed Beef Calculator (Gardner et al., 1996) was used to calculate individual boxed beef yield and carcass value estimates. Boxed beef yield represents the percentage of carcass weight as predominantly boneless, closely trimmed (.25 in or less) subprimals and lean trim. Carcass value is calculated using carcass weight, quality grade, and yield grade to generate boxed beef values in $/cwt based on January 6, 1998 prices for the 19 closely-trimmed boxed beef items which included a $3.70/cwt U.S. Choice to U.S. Select price spread. Calculated values also include a drop credit value of $7.30/cwt, cattle freight cost of $.35/cwt, and killing and fabrication costs of $86, $98, $102, and $120/steer, respectively, for yield grade 1, 2, 3 and 4 carcasses.

A mean carcass value ($/cwt) was generated based on all "A" maturity carcasses with yield grades of four or less and hot carcass weights between 550 and 950 lb. Once a mean carcass value was determined, values of discounted carcasses were then calculated. Carcasses with yield grades of 4.0 or greater were discounted $15/cwt, light carcasses (HCW< 550 lb) discounted $15/cwt, heavy carcasses (950< HCW< 1000 lb) discounted $5/cwt, and very heavy carcasses (HCW> 1000 lb) discounted $15/cwt. Hardbone carcasses (Commercial and Utility quality grades) were discounted $28/cwt. Total closely trimmed carcass value for each steer was also calculated by multiplying carcass values by the associated carcass weights to generate a total carcass value/steer. Boxed beef yield and carcass value ($/cwt and $/steer) were analyzed using the same model that was used to analyze carcass traits.

Results and Discussion

Yield Grade Traits. Hot carcass weights were heavier (P=.05; Table 1) for winter-implanted steers compared to Controls. There were no differences between Revalor-G® vs Synovex-C® or Synovex-S® (P³ .49). While there were no differences between winter implant treatments or treatment comparisons for ribeye area (P³ .31); control steers had larger (P=.03) ribeye areas adjusted for carcass weight compared with winter-implanted steers. This may be partially due to the Control steers having lighter carcasses, and the tendency (P=.06) for Control steers to have higher yielding carcasses compared with implanted steers. There were no differences in adjusted backfat thickness (P³ .18) or kidney, pelvic, and heart fat (P³ .42) across treatments.

Quality Grade Traits. Steers implanted during the dry-winter grazing period produced carcasses that had more advanced skeletal and overall maturity scores (P<.01) than non-implanted control steers (Table 2). Implanting with Synovex-S® accelerated skeletal maturity at a faster rate than Revalor-G® (P=.05); Synovex-C® implanted steers yielded carcasses that tended (P=.09) to have more advanced skeletal maturity indicies than Revalor-G®. Physiological age, listed from youngest to oldest, was Control, Revalor-G®, Synovex-C® and Synovex-S®, respectively. Results from this trial suggest that estrogenic compounds have a greater effect on increasing skeletal maturity, as physiological age determined by skeletal indicies increased as estrogen levels of implants increased. In a combined trial evaluating the same set of steers that were: 1) not implanted (control), 2) implanted once with Syonvex-Plus®, 3) Syonvex-Plus® reimplanted after 61 d with Syonvex-Plus®, and 4) Synovex-S® reimplanted with Synovex-Plus®, Al-Maamari et al. (1995) and Johnson et al. (1995) found that when steers were fed to a time-

constant endpoint, implanted steers had more advanced skeletal and overall maturities. Overall maturities, ranked by increasing physiological age, were Control, Syonvex-Plus®, Syonvex-Plus®/Syonvex-Plus®, and Synovex-S®/Syonvex-Plus® treatments. The increased percentages of carcasses with "B" maturity or greater may best describe the effects of implant treatment on skeletal maturity. Dry winter implant treatments resulted in 23.8, 17.3 and 11.4% more "B" and "C" maturity carcasses, respectively, for Synovex-C®, Synovex-S®, and Revalor-G®-implanted steers compared with non-implanted controls. This would have a definite impact if steers were marketed on a carcass basis.

Marbling scores were similar for Control and implanted steers (P=.99). Marbling score was numerically highest for steers implanted with Synovex-C®; however, marbling scores did not appear to be consistently affected by implant protocol. Steers implanted with Synovex-C® tended (P=.06) to have higher marbling scores compared with steers implanted with Revalor-G®, with similar (P=.79) marbling scores between Revalor-G® and Synovex-S® implanted steers. In a review of 37 trials involving the use of implants, Duckett et al. (1997) found that marbling scores did not differ between implanted and non-implanted steers, although implanted steers had numerically lower marbling scores.

Steers were also assigned a quality grade based on degree of marbling and maturity score. Increased skeletal maturity also influenced quality grades, with implanted steers having higher percentages of steers with quality grades of U.S. Standard or lower. The decreased quality grades are partially due to the increased number of steers with maturity scores of "B" or higher, and their inability to grade U.S. Choice or U.S. Prime based on the new USDA grading system (USDA, 1997).

Carcass Value. Boxed beef yield, expressed as a percentage of carcass weight, was higher (P=.05) for Control steers compared with implanted steers. Contrasts did not detect any differences in boxed beef yield between Revalor-G® and Synovex-C® or Synovex-S®. The increased closely-trimmed boxed beef yield may be attributed to numerically lower yield grades, including higher percentages of yield grade 2's and(or) lower percentages of yield grade 4's for Control steers. Carcass value, $/cwt of hot carcass weight, was higher for Control steers as compared to all implant treatments (P<.01; Table 3). There were no differences detected between Revalor-G® and Synovex-C® or Synovex-S® (P>.21). The increased value for Control steers may be partially attributed to: 1) yield grades tended (P=.06) to be more desirable for Control steers, which would improve their closely-trimmed boxed beef yield, or percentage of the carcass that is included in boxed beef cuts, and 2) the effect of more advanced maturity on quality grades. Because implanted steers had increased numbers of carcasses with "B" or greater maturity, more carcasses associated with the implant treatments were discounted to U.S. Standard or lower quality grades. This resulted in a $4/cwt average decrease in closely-trimmed carcass value associated with steers implanted during the dry-winter grazing phase.

Total carcass value/steer attempts to factor in the benefits of implanting, as shown by the increased carcass weights. Although implanted steers had significantly lower carcass values when expressed as $/cwt, there were no differences (P=.30) in total carcass value/steer. The decrease in carcass value was partially offset by the increase in carcass weight. Overall, it appears that implanting steers during the winter grazing period increases weight gain, but the benefits of increased weight gain may be partially offset by the effects of implants on carcass quality.

Literature Cited

Al-Maamari, M. T. et al. 1995. Okla. Agri. Exp. Sta. Res. Rep. P-943:26.

Duckett, S. K. et al. 1997. Prof. Anim. Sci. 12:205.

Gardner, T. L. et al. 1996. Ok. Ag. Exp. Sta. Res. Rep. P-951:31.

Johnson, E. S. et al. 1995. Okla. Agri. Exp. Sta. Res. Rep. P-943:35.

Paisley, S. I. et al. 1998. Okla. Agri. Exp. Sta. Res. Rep. P-965: .

Paisley, S. I. et al. 1997. Okla. Agri. Exp. Sta. Res. Rep. P-958:98.

SAS. 1990. SAS Procedures Guide (Version 6, 3rd Ed.). SAS Inst. Inc., Cary, NC.

USDA. 1997. Official U.S. Standards for Grades of Carcass Beef. AMS, USDA, Washington, DC.

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Table 1. Carcass yield grades for steers dry wintered on native tallgrass prairie receiving no implant (Control) Synovex-CÒ , Synovex-SÒ , or Revalor-GÒ implants.

						Comparisons[a]		
	Treatment[b]					Control vs	Revalor-G vs	Revalor-G vs
Item	Control	Synovex-C	Synovex-S	Revalor-G	SE[c]	Implanted	Synovex-C	Synovex-S
No. of Steers	74	72	71	72				
Carcass wt, lb	768	779	795	788	8.5	.05	.49	.55
Ribeye area, in^2	12.70	12.48	12.84	12.62	.151	.76	.51	.31
Ribeye area/cwt	1.66	1.61	1.62	1.61	.019	.03	.87	.83
Adj. backfat, in	.52	.55	.55	.54	.020	.18	.70	.86
KPH fat, %	2.37	2.42	2.40	2.36	.063	.81	.42	.57
Yield grade	3.29	3.52	3.44	3.43	.079	.06	.44	.98
Yield grade dist.								
Yield Grade 1, %	1.4	1.4	1.4	0				
Yield Grade 2, %	32.4	16.7	25.4	33.3				
Yield Grade 3, %	48.7	63.9	50.7	40.3				
Yield Grade 4, %	17.6	18.1	22.5	26.4				

[a]Observed significance levels for comparison contrasts.
[b]Least squares means for each treatment.
[c]Standard error of the least squares means.

Table 2. Carcass quality grades and maturity scores for steers dry wintered on native tallgrass prairie receiving no implant (Control) Synovex-CÒ , Synovex-SÒ , or Revalor-GÒ implants.

						Comparisons[a]		
	Treatment[b]					Control vs	Revalor-G vs	Revalor-G vs
Item	Control	Synovex-C	Synovex-S	Revalor-G	SE[c]	Implanted	Synovex-C	Synovex-S
No. of Steers	74	72	71	72				
Skeletal Maturity[d]	171.3	209.6	212.5	191.3	7.59	<.01	.09	.05
Lean Maturity[d]	165.6	163.0	164.2	165.2	3.46	.71	.65	.84

Overall Maturity[d]	169.0	191.9	193.7	180.3	5.45	<.01	.13	.08
A Maturity, %	90.5	66.7	73.2	79.2				
B Maturity, %	8.1	19.4	11.3	13.9				
C or Greater, %	1.4	13.9	15.5	7.0				
Marbling score[e]	443.1	463.6	430.3	434.5	10.90	.99	.06	.79
Prem. Choice[f], %	24.3	22.2	11.3	23.6				
Prem. L. Choice[g], %	14.9	13.9	14.1	9.7				
Low Choice, %	20.3	15.3	19.7	11.1				
Select, %	29.7	23.6	29.6	37.5				
Standard or lower, %	10.8	22.2	23.9	18.1				

[a]Observed significance levels for comparison contrasts.
[b]Least squares means for each treatment.
[c]Standard error of the least squares means.
[d]Carcass maturity scores: 100 to 199 = "A" maturity, approx. 9 - 30 mo of chronological age at slaughter, 200 to 299 = "B" maturity, approx. 30 – 42 mo, 300 to 399 = "C" maturity, approx. 42 – 72 mo (USDA 1997)
[e]Marbling score: 400 to 499 = "small" degree, the minimum for U.S. Choice.
[f]Carcasses with Modest degree of marbling or greater and "A" maturity (upper 2/3 U.S. Choice and U.S. Prime).
[g]Carcasses with Small$^{50-99}$ degree of marbling and "A" maturity.

Table 3. Carcass quality grades and maturity scores for steers dry wintered on native tallgrass prairie receiving no implant (Control) Synovex-CÒ , Synovex-SÒ , or Revalor-GÒ implants.

						Comparisons[a]		
	Treatment[b]					Control vs	Revalor-G vs	Revalor-G vs
Item	Control	Synovex-C	Synovex-S	Revalor-G	SE[c]	Implanted	Synovex-C	Synovex-S
Box Beef Yield, %[e]	70.29	69.82	69.93	70.08	.154	.05	.23	.48
Carc. Value, $/cwt[d]	96.61	92.72	92.02	92.77	1.214	<.01	.98	.66
Carcass Value/steer	740.87	721.91	730.83	728.54	11.57	.30	.68	.89

[a]Observed significance levels for comparison contrasts.
[b]Least squares means for each treatment.
[c]Standard error of the least squares means.
[e]Percent of carcass that becomes closely-trimmed boxed beef cuts.
[d]Base carcass values determined using carcass weight, quality and yield grade, with prices based on January 9, 1998 prices for 19 closely-trimmed box-beef cuts.

1998 Research Report - Table of Contents