Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 175

2006

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Recommended Citation

Veloso, L.; Loe, E.; and Unruh, John A. (2006) "Accelerated and “natural” production-system effects on performance and carcass traits," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. https://doi.org/10.4148/2378-5977.1578

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Abstract

Sixteen crossbred steers were used to compare performance and carcass characteristics of animals from accelerated and "natural"? cattle production systems. Steers in the accelerated group (8 head) were implanted with Component TE-S (120 mg of trenbolone acetate, 24 mg estradiol), and received 200 mg/steer daily of ractopamine-HCl (Optaflexx) during the last 33 days of feeding. Tylan and Rumensin were also fed to the accelerated group. "Natural"? steers were not implanted and were not given feed additives. Steers in the accelerated group had improved gain; heavier final weights; heavier carcasses; larger ribeye areas; and less kidney, pelvic, and heart fat. "Natural"? cattle had better quality grades, but would require a $3/cwt carcass premium to offset the performance advantages of accelerated cattle.

Keywords

Cattlemen's Day, 2006; Kansas Agricultural Experiment Station contribution; no. 06-205-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 959; Beef; Accelerated production system; Natural production system; Performance; Carcass traits

ACCELERATED AND "NATURAL" PRODUCTION-SYSTEM EFFECTS ON PERFORMANCE AND CARCASS TRAITS

L. Veloso, J. A. Unruh, and E. Loe

Summary

Sixteen crossbred steers were used to compare performance and carcass characteristics of animals from accelerated and "natural" cattle production systems. Steers in the accelerated group (8 head) were implanted with Component[1] TE-S (120 mg of trenbolone acetate, 24 mg estradiol), and received 200 mg/steer daily of ractopamine-HCl (Optaflexx[2]) during the last 33 days of feeding. Tylan[2] and Rumensin[2] were also fed to the accelerated group. "Natural" steers were not implanted and were not given feed additives. Steers in the accelerated group had improved gain; heavier final weights; heavier carcasses; larger ribeye areas; and less kidney, pelvic, and heart fat. "Natural" cattle had better quality grades, but would require a $3/cwt carcass premium to offset the performance advantages of accelerated cattle.

Introduction

Changing consumer attitudes and concerns about production-enhancing compounds has led to an increasing demand for "natural" beef. The term "natural" often refers to animals fed a vegetarian diet, and produced without antibiotics, metabolism modifiers, or implants.

Our study was part of a course (ASI 315, Livestock and Meat Evaluation) that related live cattle characteristics to carcass traits, and demonstrated the effects of some available production modifiers on production and carcass characteristics.

Procedures

Sixteen steers were backgrounded on flint hills pasture for 163 days and divided into two pens (accelerated and "natural") on the basis of their pasture average daily gain and ending body weight. The ending pasture weight and gain of cattle assigned to the accelerated treatment were 801 lb and 1.29 lb/day, whereas those for the "natural" treatment were 801 lb and 1.30 lb/day. After 16 days of feeding, the trial was initiated by implanting the accelerated group with Component TE-S (120 mg of trenbolone acetate, 24 mg estradiol) and feeding Rumensin and Tylan for the entire feeding period. The "natural" group received no additives or implants. After 72 days on feed, steers in the two pens were separated into six pens (3 pens per treatment). Pens were assigned by weight at entry to the feedlot. Steers in the heaviest pen (2 steers/pen) for each treatment were harvested after 106 days on feed, steers in the second-heaviest pen (3 steers/pen) were harvested after 113 days on

[1]Component is a registered trademark of Ivy Animal Health, Overland Park, KS.

[2]Optaflexx, Tylan, and Rumensin are registered trademarks of Elanco Animal Health, Indianapolis, IN.

feed, and steers in the lightest pen for each treatment (3 steers/pen) were harvested after 120 days on feed. Weekly harvest facilitated class evaluation of live animals and their corresponding carcasses. During the last 33 days of the feeding period, the accelerated pens were fed 200 mg/steer of ractopamine-HCl (Optaflexx).

Cattle were harvested in the KSU Meat Science Laboratory after quality grade, yield grade, and price/cwt of the live cattle were evaluated in class. Carcass cutability and quality characteristics were evaluated at 24 hours postmortem. A one-inch ribeye (longissimus) steak was removed from the 12th rib, vacuum packaged, and aged until 14 days postmortem. Steaks were cooked to 160°F internal temperature according to thermocouples placed in the center of the steak, and were evaluated for cooking loss and Warner-Bratzler shear force.

Results and Discussion

Few statistical differences were observed between the accelerated and the "natural" cattle, likely because of the limited number of experimental units.

During the last 33 days on feed, accelerated cattle (fed Optaflexx) had greater daily gains and were more efficient in converting feed into gain than "natural" cattle were (Table 1). Although not statistically significant, daily gain seemed greater during the first 72 days on feed for accelerated cattle (implanted and fed with Rumensin and Tylan). Over the entire feedlot period, accelerated cattle had greater daily gains and gained 68 lb more than did "natural" cattle.

For carcass traits, only carcass maturity was statistically different (Table 2). Accelerated cattle had higher maturity scores due principally to the very aggressive implant used in the study. Carcasses from accelerated cattle were numerically 25 lb heavier and contained ribeye areas numerically 1 square inch larger than those from "natural" cattle. As a result, accelerated cattle had greater cutability (numerically lower yield grade numbers) despite having similar fat thickness, compared with that of "natural" cattle. The "natural" cattle had numerical advantages in quality as indicated by more marbling, resulting in a greater percentage that graded Choice, and lower Warner-Bratzler shear force values.

On the basis of USDA average premiums and discounts reported on February 21, 2005, accelerated cattle had $23.81 more carcass value than "natural" cattle had (Table 3). After subtracting costs, accelerated cattle had $24.46 greater return. As a result, a $3/cwt carcass premium would be needed for the "natural" cattle to offset the performance advantages of the accelerated cattle.

Overall, the accelerated cattle had improved gains while consuming similar amounts of feed, compared with performance of "natural" cattle. As a result, accelerated cattle had heavier final live weights and carcass weights. They also had carcasses with greater cutability, resulting from larger ribeye areas and less kidney, pelvic, and heart fat. "Natural" cattle had higher quality grades, but would require a $3/cwt carcass premium to offset the advantages in performance from accelerated cattle.

Table 1. Accelerated and "natural" production-system effects on feedlot performance

Item	Accelerated	Natural	SEM	P-value
Number of cattle	8	8	---	---
Weight, lb				
Initial	855	871	25	0.52
At 72 days	1250	1232	37	0.64
At slaughter	1400	1350	42	0.24
Feedlot weight gain[1]	548	480	33	0.07
Daily gain, lb/day				
Days 1 to 72	5.4	5.0	0.37	0.22
Optaflexx[2]	4.3	3.0	0.21	<0.01
Day 1 to slaughter[1]	4.8	4.2	0.28	0.07
Dry matter intake, lb/day				
Days 1 to 72	23.1	23.8	---	---
Optaflexx[2]	24.3	24.5	1.96	0.89
Day 1 to slaughter[1]	26.8	27.4	---	---
Feed:gain				
Days 1 to 72 days	4.5	5.0	---	---
Optaflexx[2]	5.8	8.6	0.56	0.03
Day 1 to slaughter[1]	5.5	6.5	---	---

[1]Cattle were fed in an accelerated or natural treatment for 72 days. Cattle were then divided into three pens per treatment, and accelerated cattle were fed Optaflexx for the last 33 days on feed. Cattle were slaughtered after 106, 113 or 120 days on feed.
[2]Final 33 days on feed.

Table 2. Accelerated and "natural" production-system effects on carcass characteristics and Warner-Bratzler shear force (WBSF)

Item	Accelerated	Natural	SEM	P-value
Number of cattle	8	8	---	---
Hot carcass weight, lb	842	817	25	0.33
Dressing percentage	60.5	60.9	1.0	0.24
Fat thickness, inches	0.36	0.38	0.05	0.67
Ribeye area, square inches	16.1	15.1	0.95	0.36
Kidney, pelvic, and heart fat, %	1.6	2.0	0.19	0.07
Yield grade	1.8	2.2	0.42	0.40
Maturity	A-71	A-60	3.2	<0.01
Marbling[1]	356	396	37	0.30
Quality grade[2]	248	278	26.4	0.36
Choice, %	12.5	50.0	---	---
Cook weight loss, %[3]	18.9	17.5	1.6	0.38
WBSF, kg	4.0	3.7	0.28	0.32
Ribeye color score[4]	3.42	3.29	0.43	0.77
L*	44.1	45.0	2.2	0.70
a*	32.0	33.0	0.70	0.22
b*	24.8	25.7	0.76	0.27
Hue angle	37.73	37.96	0.35	0.52
Saturation index	40.5	41.8	1.0	0.23

[1]Slight = 300, small = 400.
[2]Select = 200, Choice = 300.
[3]Cooking loss = (raw sample weight – cooked sample weight) / 100.
[4]Ribeye color was evaluated at 24 hours postmortem.

Table 3. Financial comparison of accelerated and "natural" production systems

Item	Accelerated	Natural	Difference[1]
Number of cattle	8	8	---
Carcass value, $/steer[2]	1182.87	1159.06	–23.81
Purchase cost, $/steer[3]	898.02	915.04	+17.02
Processing cost, $/steer	10.50	7.60	–2.90
Feed costs, $/steer	262.98	249.51	–13.47
Yardage, $/steer	28.50	28.50	0.00
Net return, %	–17.13	–41.59	–24.46

[1]**"**natural" - accelerated**.**
[2]Carcass price was derived from USDA average premiums and discounts reported on February 21, 2005. (www.ams.usda.gov/mnreports/lm_ctlss.txt) Base Choice carcass price was $142.85/ cwt, with average Choice (+$0.69), Select (-$4.88), Yield grade 1.0-1.9 (+$2.85), Yield grade 2.0-2.4 (+$1.63), Yield grade 2.5-2.9 (+$1.21), Yield grade 3.0-3.4 (-$0.08), and carcass weights 900-950 (-$0.58) premiums and discounts.
[3]Purchase price was $106.40/cwt.