



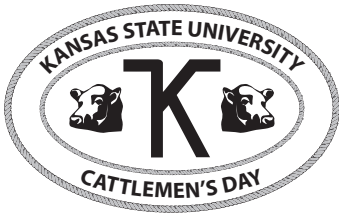
CATTLEMEN'S DAY 2020

BEEF CATTLE RESEARCH

SUMMARY PUBLICATION



CATTLEMEN'S DAY 2020



BEEF CATTLE
RESEARCH

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BEEF CATTLE RESEARCH

For more information, contact:

KC Olson
Ruminant Nutrition
785-532-1254
kcolson@ksu.edu

Dale A. Blasi
Extension Beef Specialist
785-532-5427
dblasi@ksu.edu

Effects of Prescribed Fire Timing on Stocker Cattle Performance, Native Plant Composition, and Forage Biomass in the Kansas Flint Hills: Year One of Six

Zachary Duncan

Objective: Our objective was to document the effects of prescribed fire timing on yearling beef cattle performance, native plant composition, and forage biomass accumulation in the Kansas Flint Hills.

Study Description: Our study took place at the Kansas State Beef Stocker Unit located northwest of Manhattan, KS. Pastures were assigned to one of three prescribed-burn treatments: early spring (April), mid-summer (August), or early fall (October). Treatments were applied and yearling heifers (n = 360) were subsequently grazed from May to August. Native plant composition and forage biomass were evaluated annually in late June and early July.

Effects of prescribed fire timing on yearling cattle performance, forage biomass accumulation, and total grass and forb cover

Item,	Prescribed fire season			Standard error of the mean	P-value
	Spring	Summer	Fall		
Total body weight gain, lb	236 ^a	207 ^b	215 ^b	9.49	0.02
Forage biomass, lb dry matter/acre	852 ^b	1120 ^a	680 ^c	27.75	< 0.01
Total grass cover, % of total basal cover	91	92	87	2.46	0.13
Total forb cover, % of total basal cover	7.1	8.4	11.0	2.39	0.28

^{a,b,c}Within rows, means with unlike superscripts differ ($P \leq 0.05$).

The Bottom Line: The first year of data from a six-year study indicated that prescribed fire timing affected stocker cattle performance and forage biomass availability but not basal cover of forage grasses and forbs.



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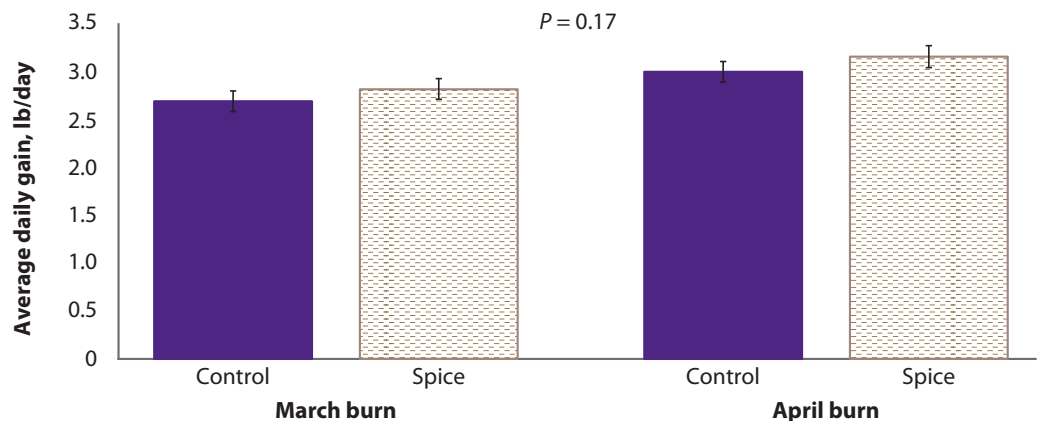
Jaymelynn Farney
Extension Beef Systems Specialist
620-820-6125
jkj@ksu.edu

Evaluating Stocker Steer Gains on Tallgrass Native Range with Two Burn Dates and Spices in Mineral

Jaymelynn Farney

Objective: The overall objective of this study was to evaluate management practices that may impact stocker steer gains on a 90-day double stocking grazing system in tallgrass native range. Specific objectives include evaluating the timing of burning, addition of spices in a complete free-choice mineral, and determination if the effects are additive.

Study Description: Two pasture burning times (March or April) and free-choice mineral with or without addition of spices were evaluated using 281 head of stocker steers on eight pastures of tallgrass native range. The spices included garlic oil in powder form and Solace (Wildcat Feeds LLC). Cattle were weighed at the start of the study and the end. Steers grazed pastures for 87 days. Data analyzed included average daily gain, total gain, and final weight.



Average daily gain based on each burn time (March or April) and whether cattle were on control mineral or mineral with spices.

¹Control mineral (solid bars) was a complete free-choice mineral formulated for a 4 oz/head/day intake (Wildcat Feeds LLC, Topeka, KS). Chelated mineral sources were included at 25% of the total mineral supply for magnesium (Nuplex Mg/K, Nutech Biosciences Inc., Oneida, NY), copper, zinc, and manganese (Nuplex 3-chelate blend, Nutech Biosciences).

²Spice mineral (striped bars) was a complete free-choice mineral formulated for a 4 oz/head/day intake (Wildcat Feeds LLC, Topeka, KS) with the spices in powdered form of garlic oil (3 lb/ton) and Solace (proprietary blend of spices; 18 lb/ton; Wildcat Feeds LLC). Chelated mineral sources were included at 25% of the total mineral supply for magnesium (Nuplex Mg/K, Nutech Biosciences Inc.), copper, zinc, and manganese (Nuplex 3-chelate blend, Nutech Biosciences).



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The Bottom Line: Burning pastures in April results in a greater calf gain than burning in March, while the addition of spices to a free-choice complete mineral shows promise as a cost-effective method to increase gains in stocker steers on tallgrass native range.

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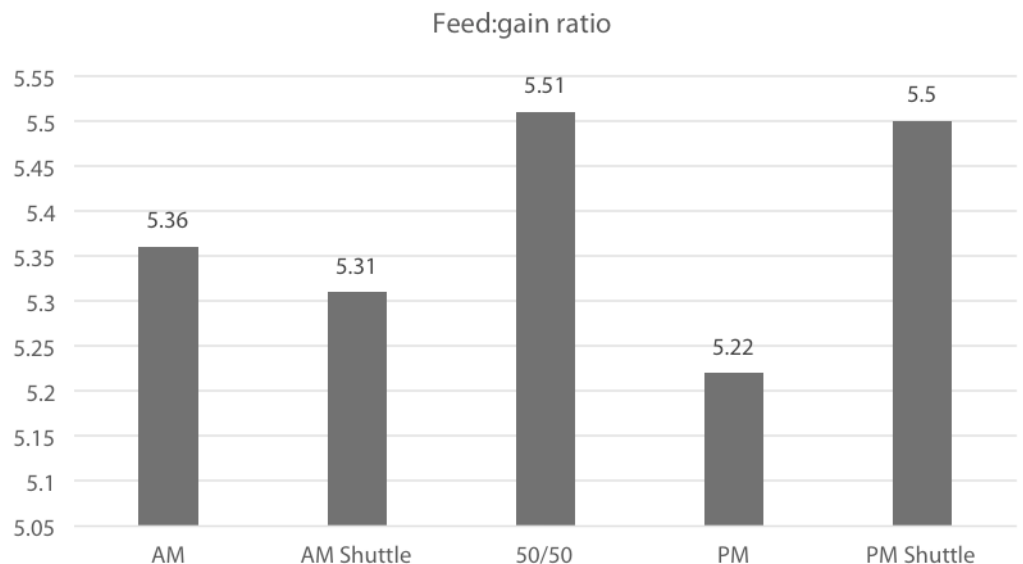
Dale A. Blasi
Extension Beef Specialist
785-532-5427
dblasi@ksu.edu

Effects of Limit Feeding Cold Stressed Growing Calves in the Morning Versus the Evening, as well as Bunk Line Sharing on Performance

Charles Sasscer

Objective: To determine the response of cold stressed growing calves to being fed in the evening instead of morning hours, as well as the effect of bunk line sharing.

Study Description: Crossbred steers ($n = 360$) of Texas, Oklahoma, and Idaho origin were blocked by weight into four size groups and randomly assigned to pens, which were randomly allocated to one of five treatments. All steers received a diet formulated to provide 60 Mcal net energy for gain/100 lb of dry matter and were limit fed with a target of 2.0% of their body weight in dry matter intake. Treatments consisted of being fed in the morning (AM), in the evening (PM), fed half of their feed in the morning and half in the evening (50/50), and two treatments that allowed cattle to be fed in the same pen yet were rotated twice daily utilizing a holding pen, allowing for half of the calves to be fed in the morning (Shuttle AM) and half to be fed in the evening (Shuttle PM), doubling the use of the pen and bunk line. The steers were fed for 77 days and individual animal weights were taken on day -1 (allocation), day 0 (initial processing), day 64/65 (blood sampling), and day 77 (final weights). Plasma glucose was obtained individually on day 64 and 65, and pen weights were collected on days 0, 21, 28, 35, 56, 63, 70, and 77.



The Bottom Line: When limit feeding cold stressed growing calves, neither shifting from morning feed delivery to evening feed delivery, nor bunk line sharing significantly improves the efficiency of feed conversion.



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For more information, contact:

Karol Fike
Reproductive Physiology
785-532-1104
karol@ksu.edu

Bob Weaber
Extension Cow-Calf Specialist
785-532-1460
bweaber@ksu.edu



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Sale Price of Holstein Feeder Steer Lots Relative to Other Breed Descriptions Sold Through Superior Livestock Video Sales from 2010 Through 2018

Esther McCabe

Objective: The objective of this study was to determine the relative value of Holstein feeder steer lots compared to steer lots of other breed descriptions sold through video auctions while adjusting for all other factors that significantly influenced sale price.

Study Description: Data were analyzed from 14,075 lots of feeder steers sold via 211 livestock video auctions from 2010 through 2018. All lot characteristics that could be accurately quantified or categorized were used to develop a multiple regression model with backwards selection. A lot was categorized into one of four breed descriptions: 1) English, English crossed; 2) English-Continental crossed; 3) Brahman influenced; and 4) Holstein.

Sale price of Holstein feeder steer lots relative to other breed descriptions sold through 211 Superior Livestock Auction video sales from 2010 through 2018

Breed description	Number of lots	Least squares mean of sale price (\$/cwt)	Regression coefficient
2010–2018			
English, English crossed	3,829	152.39 ^a	41.83
English-Continental crossed	4,310	150.61 ^b	40.05
Brahman influenced	4,945	148.75 ^c	38.19
Holstein	991	110.56 ^d	0.00
2010–2012			
English, English crossed	1,252	128.10 ^a	34.47
English-Continental crossed	1,562	126.81 ^b	33.18
Brahman influenced	2,185	125.56 ^c	31.93
Holstein	282	93.63 ^d	0.00
2013–2015			
English, English crossed	1,171	182.43 ^a	44.82
English-Continental crossed	1,485	180.46 ^b	42.85
Brahman influenced	1,630	178.83 ^c	41.22
Holstein	373	137.61 ^d	0.00
2016–2018			
English, English crossed	1,465	145.62 ^a	47.84
English-Continental crossed	1,359	144.47 ^b	46.69
Brahman influenced	1,283	141.97 ^c	44.19
Holstein	360	97.78 ^d	0.00

Breed description affected the sale price ($P < 0.0001$).

^{a,b,c,d}Prices without a common superscript differ ($P < 0.05$) within years.

The Bottom Line: The relative price discount for Holstein feeder steer lots compared with other breed descriptions appears to have increased from 2010–2018, and thus is likely indicating lessening interest in the feedlot sector to feed Holstein steers to harvest.

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BEEF CATTLE RESEARCH

For more information, contact:

Karol Fike
Reproductive Physiology
785-532-1104
karol@ksu.edu

Bob Weaber
Extension Cow-Calf Specialist
785-532-1460
bweaber@ksu.edu

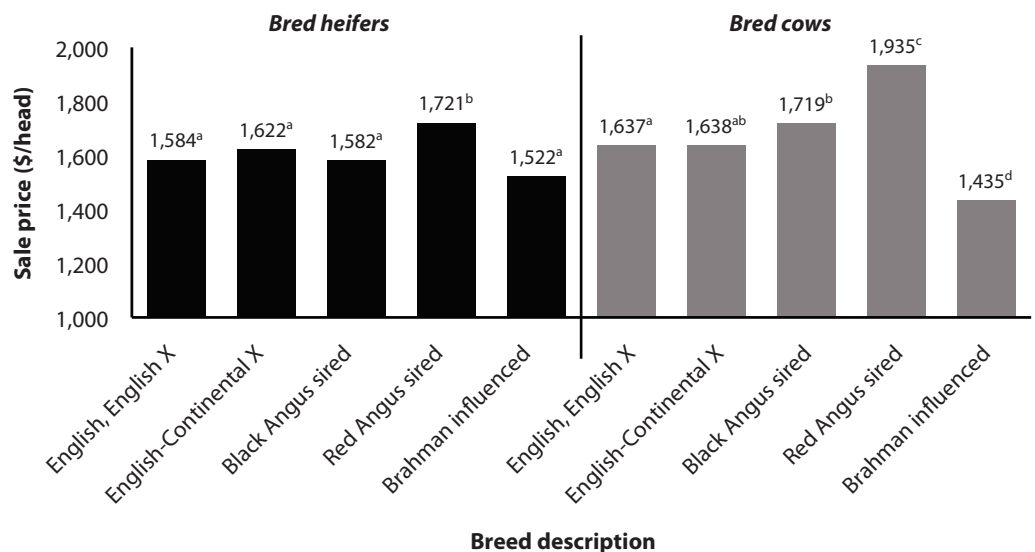
Factors Affecting the Sale Price of Bred Heifers and Bred Cows Sold Through Superior Livestock Video Auctions

Maggie Smith

Objective: The objective of the study was to evaluate potential factors influencing the sale price of bred heifers and bred cows sold through video auctions while adjusting for all other factors that significantly influenced prices.

Study Description: Descriptive characteristics of lots offered for sale were obtained through a livestock video auction service (Superior Livestock Auction, Fort Worth, TX). Data were available on 1,870 lots of bred heifers sold through video auctions from 2010 through 2018 and 1,237 lots of bred cows sold through video auctions from 2011 through 2018. Two separate multiple regression models were developed to determine the factors influencing the sale price for each.

Results: Significant factors influencing the price of bred heifers and bred cows included sale year, breed description, weight, frame score, and flesh score. Results indicate that multiple elements influence the sale price of bred females, suggesting that buyers utilize several components of information at the time of sale.



^{a,b,c,d}Values within a factor without a common superscript differ ($P < 0.05$).

The Bottom Line: Understanding the various factors influencing the sale price of bred heifers and bred cows will allow producers to make more informed investment decisions.

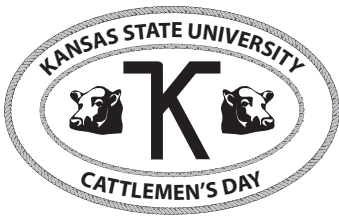


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For more information, contact:

Karol Fike
Reproductive Physiology
785-532-1104
karol@ksu.edu

Bob Weaber
Extension Cow-Calf Specialist
785-532-1460
bweaber@ksu.edu

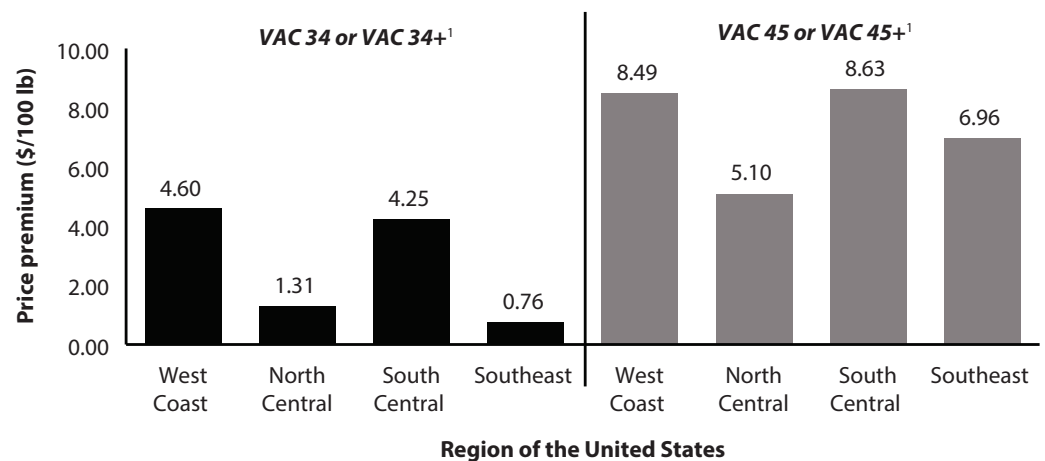
Region of Origin in the United States Affects Price Premiums Associated with Value-Added Health Protocols of Beef Calf Lots Sold Through Summer Video Auctions from 2010 Through 2018

Maggie Smith

Objective: The objective was to evaluate the effects of value-added calf health protocols within various regions of the United States on the sale price of beef calf lots sold via summer video auction.

Study Description: Information describing lot factors was obtained through a livestock video auction service (Superior Livestock Auction, Fort Worth, TX). Descriptive characteristics were available over nine years (2010-2018) representing 43,242 lots of beef calves. Data were evaluated to investigate participation in various health programs across regions. A multiple regression model was developed for each region to determine the value associated with health protocols throughout regions of the United States.

Results: Evident price advantages were observed throughout all regions, indicating that rigorous vaccination and health management is advantageous for cow-calf producers across the United States. As distance from the highest concentrated area of cattle feeding increased, premiums associated with health protocols were discovered to be greater.



¹Recognized vaccination protocols available at www.SuperiorLivestock.com.



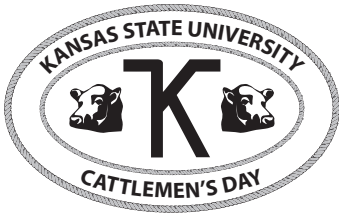
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The Bottom Line: While variation in the sale price of beef calves across regions suggests evident differences in the recognized value by buyers, results indicate the value associated with the vaccination and management of calves with potentially larger transportation distances from origin to delivery.

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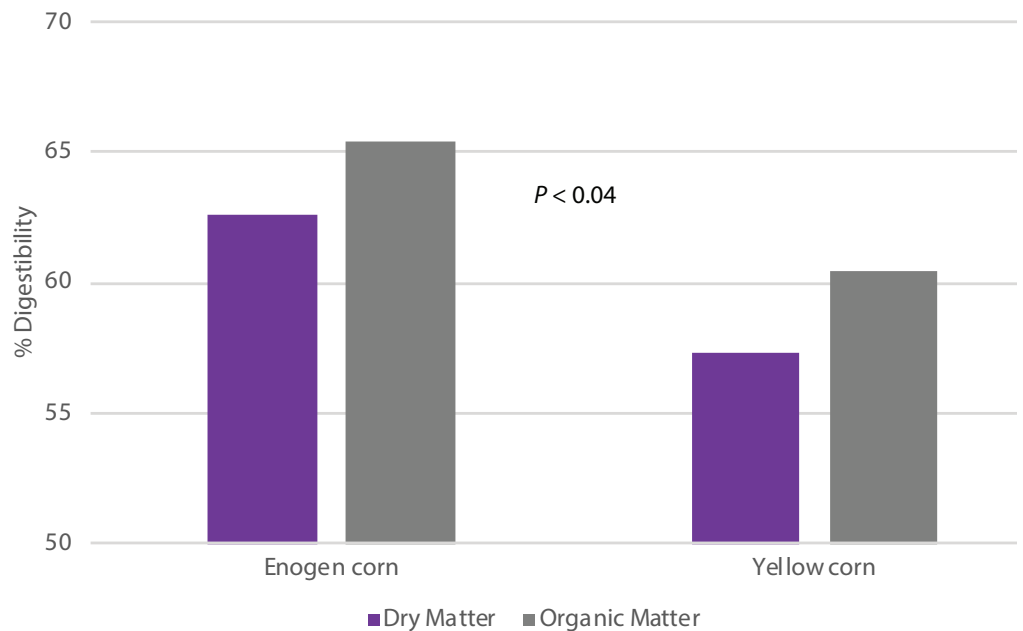
Dale A. Blasi
Extension Beef Specialist
785-532-5427
dblasi@ksu.edu

Syngenta Enogen Feed Corn Containing an Alpha Amylase Expression Trait Improves Digestibility in Growing Calf Diets

Marissa Johnson

Objective: To evaluate the digestibility parameters of growing cattle when fed Enogen Feed corn.

Study Description: Seven cannulated Holstein steers were used to determine the effects on digestibility when fed Enogen Feed corn (Syngenta) as whole-corn or processed as dry-rolled at ad libitum intake.



The Bottom Line: When Enogen Feed corn was fed in an ad libitum fashion to growing calves, dry matter and organic matter are digested to a greater extent relative to yellow corn.

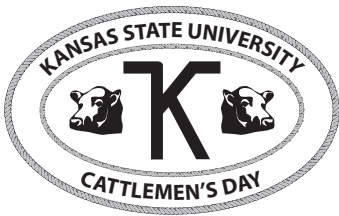


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For more information, contact:

Evan Titgemeyer
Ruminant Nutrition
785-532-1220
etitgeme@ksu.edu

Dale Blasi
Extension Beef Specialist
785-532-5427
dblasi@ksu.edu

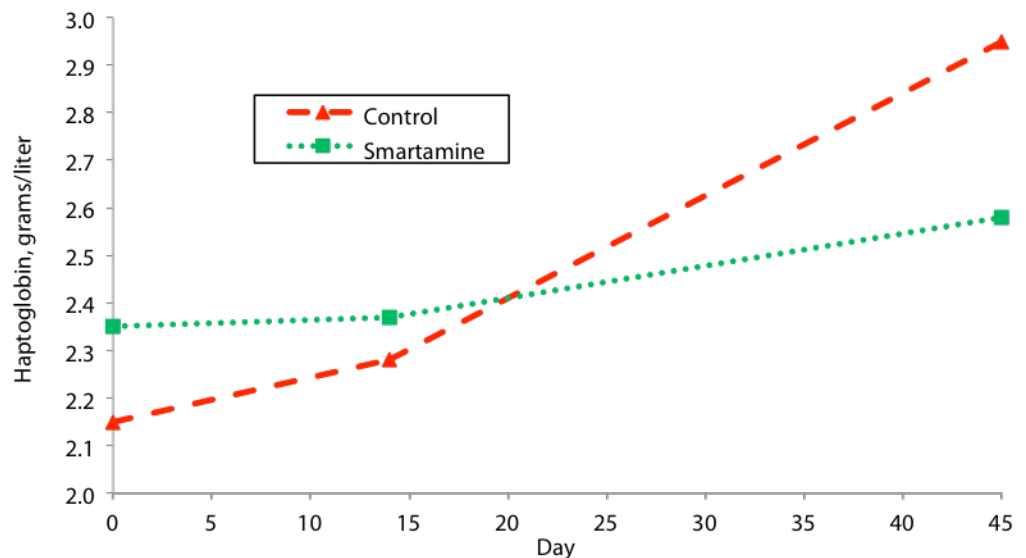
Smartamine M Supplementation Reduces Inflammation but Does Not Affect Performance in Receiving Beef Heifers

Madeline Grant

Objective: This study was conducted to evaluate the ability of supplemental methionine to improve health, inflammation status, and performance of receiving cattle.

Study Description: A group of 384 crossbred heifers (initial weight 489 lb) of Tennessee origin were used in a 45-day receiving trial with limit-feeding to evaluate the effects of supplemental methionine (Smartamine M; Adisseo, Alpharetta, GA) on health, inflammation, and performance. Cattle received either 0 (control) or 10 grams/day Smartamine M, a ruminally protected methionine product. Plasma haptoglobin levels measured on days 0, 14, and 45 were used as a biomarker of inflammation.

Results: No differences in average daily gain ($P \geq 0.52$) or gain-to-feed ratio ($P \geq 0.28$) were observed for this trial. For plasma haptoglobin, interaction between dietary treatment and linear effect of day was observed ($P = 0.05$).



Effect of Smartamine M supplementation on plasma haptoglobin over time.

Treatment \times linear day interaction, $P = 0.05$, standard error of the mean = 0.22.

The Bottom Line: Supplemental methionine supplied by Smartamine M does not improve performance but reduces inflammation and possibly improves immune function in receiving heifers.



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BEEF CATTLE
RESEARCH

For more information, contact:

Evan Titgemeyer
Ruminant Nutrition
785-532-1220
etitgeme@ksu.edu

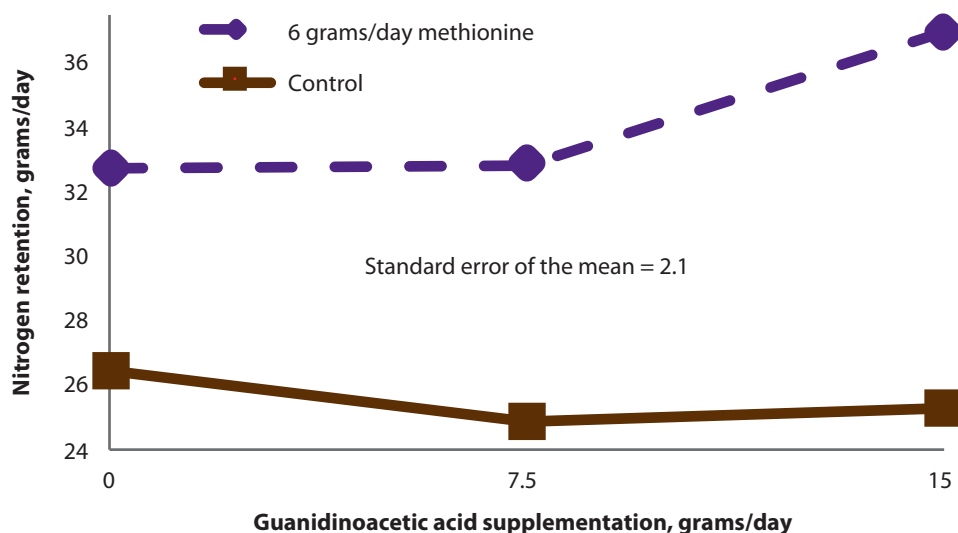
A.J. Tarpoff
Extension Beef Veterinarian
785-532-1255
tarpoff@ksu.edu

Effects of Guanidinoacetic Acid on Lean Growth and Methionine Flux in Cattle

Mehrnaz Ardalan

Objective: To evaluate the effect of supplementing guanidinoacetic acid in the presence or absence of L-methionine on nitrogen retention (lean tissue growth) when cattle were purposefully maintained under conditions of a methionine deficiency.

Study Description: Seven ruminally-cannulated Holstein steers (355 lb) were used in an experiment where each steer received each of six treatments. Treatments were abomasal infusion of 0 or 6 g/day methionine, and 0, 7.5, or 15 g/day guanidinoacetic acid, with all combinations represented. Energy was supplied by ruminal infusion of volatile fatty acids and abomasal infusion of glucose. All essential amino acids except methionine were infused abomasally to make methionine the most limiting amino acid.



The Bottom Line: Supplementation with 15 g/day of guanidinoacetic acid tended to increase lean tissue growth when steers received supplemental methionine, probably by increasing creatine synthesis by the steers.



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For more information, contact:

Elizabeth Boyle
Extension Meat Science Specialist
785-532-1247
lboyle@ksu.edu

The Use of Bioelectrical Impedance to Assess Shelf-Life of Beef *Longissimus Lumborum* Steaks

Francisco Najar

Objective: The objective of this study was to evaluate the efficacy of using surface and internal bioelectrical impedance to assess beef *longissimus lumborum* shelf-life during 15 days of simulated retail display.

Study Description: Beef strip loins, obtained from three commercial processors (postmortem age = 27, 34, or 37 days), were fabricated into 12 1-inch thick steaks. Steaks were subdivided into six consecutively cut pairs, packaged on Styrofoam trays, overwrapped with polyvinyl chloride film, and displayed under fluorescent lighting at 32–40°F in coffin-style retail cases for 15 days. Microbiological analysis, pH, bioelectrical impedance analysis, objective color assessment, proximate composition, and lipid oxidation were measured. Surface and internal bioelectrical impedance assessment were compared.

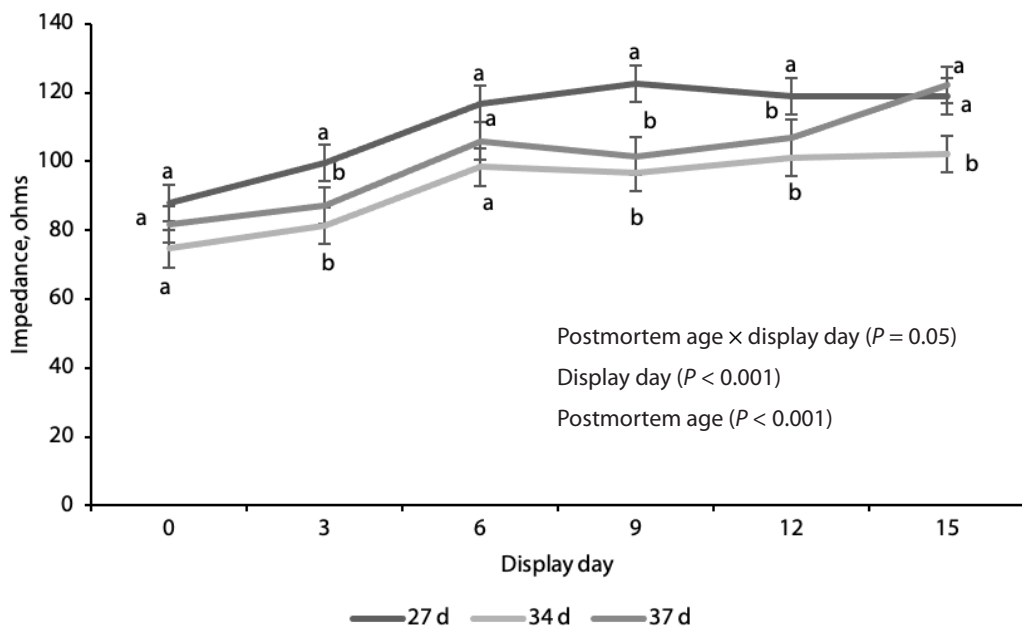


Figure 1. Surface bioelectrical impedance values of beef *longissimus lumborum* steaks aged 27, 34, or 37 days and displayed for 15 days under fluorescent lighting at 32–40°F. ^{ab}Means with different superscripts differ ($P < 0.05$).

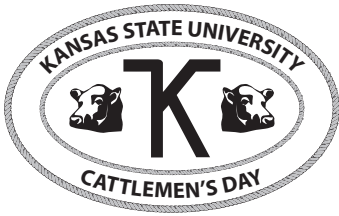
The Bottom Line: Internal bioelectrical impedance has potential for use to assess shelf-life of retail steaks and it was more precise than surface bioelectrical impedance; however, internal bioelectrical impedance may translocate bacteria into the muscle. Protein degradation and water holding capacity should be evaluated to better understand bioelectrical impedance changes over time.



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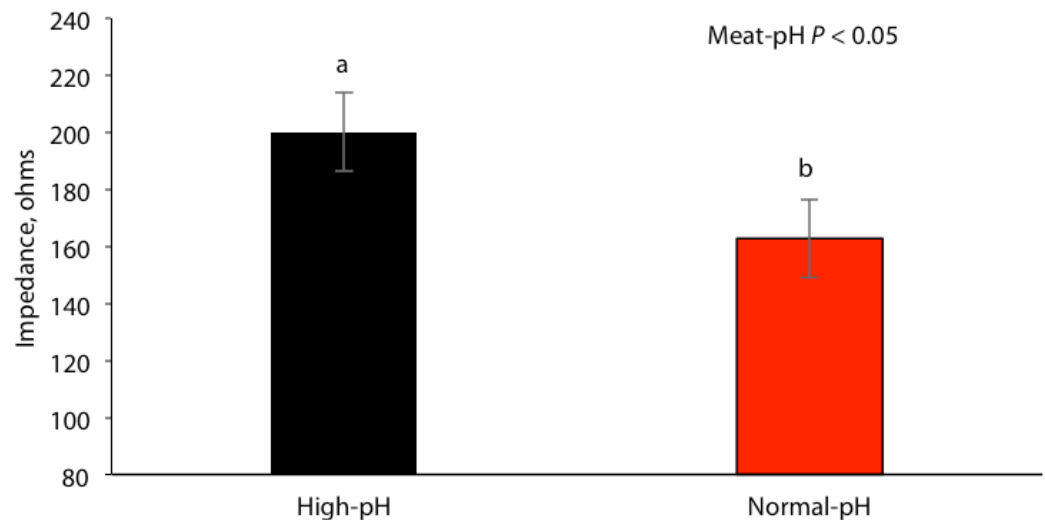
Elizabeth Boyle
Extension Meat Science Specialist
785-532-1247
lboyle@ksu.edu

Beef *Longissimus Lumborum* Steak pH Affects External Bioelectrical Impedance Assessment

Francisco Najar

Objective: To use external bioelectrical impedance analysis to assess postmortem chemical changes in normal- and high-pH beef *longissimus lumborum* steaks during simulated retail display.

Study Description: Beef strip loins (n = 20; postmortem age = 14 d) obtained from a commercial processor were sorted into two treatments, normal-pH (5.61–5.64; n = 11) and high-pH (6.2–7.0; n = 9). Loins were fabricated into five 1-inch thick steaks (n = 100), and randomly assigned to one of five display days: 1, 3, 5, 7, and 9. External bioelectrical impedance values, oxygen consumption, metmyoglobin reducing ability, protein degradation, water holding capacity, and pH were assessed on each storage day.



External bioelectrical impedance values of high-pH and normal-pH beef *longissimus lumborum* steaks.

^{ab}Means with different superscripts differ ($P < 0.05$).

The Bottom Line: External bioelectrical impedance is a method that could be used to separate normal- and high-pH strip loins with potential for rapid, in-plant use to identify dark-cutting beef.

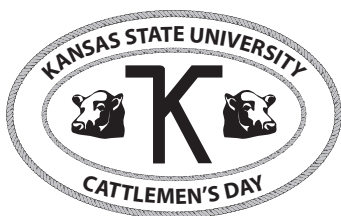


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For more information, contact:

Michael Chao
Meat Science
785-532-1230
mdchao@ksu.edu

Elizabeth Boyle
Extension Meat Science Specialist
785-532-1247
lboyle@ksu.edu

Sensory Evaluation from Asian Consumers of Six Different Beef Shank Cuts

WanJun Wu

Objective: The objective of this study was to evaluate factors affecting Asian consumers' purchasing decisions and eating preferences of six different beef shank cuts.

Study Description: Six different beef shank cuts, three from the forequarter [*biceps brachii* (shank A); a combination of *deep digital flexor* and *flexor digitorum superficialis* (shank B); *extensor carpi radialis* (shank C)], and three from the hindquarter [*flexor digitorum superficialis* (shank D); *deep digital flexor* (shank E); and a combination of *long digital extensor*, *medial digital extensor* and *peroneus tertius* (shank F)] were collected from 12 U.S. Department of Agriculture Low Choice beef carcasses. Shanks from the left side of the carcasses were used for consumer taste panels, and consumers visually evaluated size and surface color of samples from the right side of the carcasses.

Consumer sensory and visual evaluation ratings of overall liking, and acceptability percentage for various beef shank cuts

Beef shank cuts	Sensory overall liking ¹	Sensory acceptability (%) ²	Visual overall liking ³	Visual acceptability (%) ⁴
Fore shank				
A	69.26 ^{ab}	94.95 ^{ab}	63.79 ^{ab}	95.37 ^a
B	45.55 ^d	62.27 ^c	58.68 ^{bc}	84.82 ^b
C	58.91 ^c	88.72 ^b	67.45 ^a	96.53 ^a
Hind shank				
D	73.10 ^a	96.99 ^a	52.99 ^c	74.11 ^b
E	62.33 ^{bc}	91.86 ^{ab}	59.05 ^{bc}	84.82 ^b
F	67.83 ^{ab}	93.93 ^{ab}	59.16 ^{bc}	84.82 ^b
SEM ⁵	3.10	3.19	3.06	3.58
P-value	<0.01	<0.01	0.02	<0.01

^{a-d}Least squares means without a common superscript differ ($P < 0.05$).

¹Sensory overall liking scores: 0 = dislike extremely; 50 = neither like nor dislike; 100=like extremely.

²Sensory acceptability (%) = percentage of consumers liked the cut ÷ total number of observations.

³Visual overall liking scores: 0 = dislike extremely; 50 = neither like nor dislike; 100=like extremely.

⁴Visual acceptability (%) = percentage of consumers liked the cut ÷ total number of observations.

⁵Standard error of the least squares mean.

The Bottom Line: There were differences among consumer preferences for different shank cuts. Consumers preferred shanks A, D, and F in the sensory taste panel, while shanks A and C were the most preferable in visual evaluation. Shanks A, D, and F should be priced with a premium, while shank C should be discounted in domestic Asian and international markets.



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