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CATTLEMEN'S DAY

Cattlemen's Day 2017

Beef Cattle Research

Summary Publication

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

CATTLEMEN'S DAY 2017

BEEF CATTLE RESEARCH

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Control of Sericea Lespedeza with Growing-Season Prescribed Burning Gets Stronger Over Time

KC Olson

Objective: Our objective was to monitor the effects of 3 consecutive years of growing-season prescribed burning on vigor of the noxious weed sericea lespedeza (*Lespedeza cuneata*) in the Kansas Flint Hills.

Study Description: Nine fire-management units (12 ± 6 acres) were burned at 1 of 3 prescribed-burning times: early spring (control; April 1), mid-summer (August 1), or late summer (September 1).

Effects of prescribed-burn timing of native tallgrass rangeland on forage biomass, canopy frequency, and seeds per plant of sericea lespedeza.

Item	Early-spring burn (April 1)	Mid-summer burn (August 1)	Late-summer burn (September 1)	Standard Error*	P-value†
Plant canopies containing sericea lespedeza, %	49.9[a]	31.4[b]	20.3[b]	6.48	< 0.01
Whole-plant dry matter weight, mg/plant	3,954[a]	460[b]	163[b]	561.1	< 0.01
Seeds, number/plant	710.8[a]	32.6[b]	0.5[b]	117.82	< 0.01

* Mixed-model standard error associated with comparison of treatment main effect means.
† Treatment main effect.
[ab] Means within a row with unlike superscripts are different (P≤0.05).

The Bottom Line: Compared to traditional spring burning, burning during the summer months for 3 consecutive years resulted in major decreases in sericea lespedeza canopy frequency, plant weight, and seed production. Growing-season prescribed burning is an inexpensive and comprehensive means to control sericea lespedeza infestations.

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Growing-Season Prescribed Burning Has No Negative Effects on Soil Cover or Plant Species Composition Compared with Conventional Spring Burning

KC Olson

Objective: Our objective was to monitor the effects of 3 consecutive years of growing-season prescribed fire (August or September) on soil cover and basal plant cover of native grasses, shrubs and forbs.

Study Description: Nine fire-management units (12 ± 6 acres) were burned at 1 of 3 prescribed-burning times: early spring (4/1), mid-summer (7/30), or late summer (9/1). Plant species composition and soil cover were assessed annually each July using a modified step-point technique.

Effects of prescribed-burn timing of native tallgrass rangeland on graminoid basal cover, forb basal cover, occurrence of bare soil and litter cover during the middle of the growing season.

Item	Early spring burn (04/01)	Mid-summer burn (07/30)	Late-summer burn (09/01)	P-value†
Bare soil, % of total area	40.4	42.2	38.2	0.92
Litter cover, % of total area	49.3	47.9	49.9	0.98
Basal vegetation cover, % of total area	10.3	9.9	11.9	0.38
Total grass cover, % of total basal cover	84.4	86.2	88.0	0.44
Total forb cover, % of total basal cover	13.7	11.8	9.6	0.36
Total shrub cover, % of total basal cover	1.9	1.9	2.4	0.60

† Treatment main effect.

The Bottom Line: Compared to traditional prescribed burning in the spring, burning during the summer months resulted in no negative changes in percentage of bare soil, litter, or basal plant cover. Growing season prescribed fire is temporally compatible with intensive, early stocker grazing systems and has reportedly been associated with strong suppression of undesirable plant species such as sericea lespedeza.

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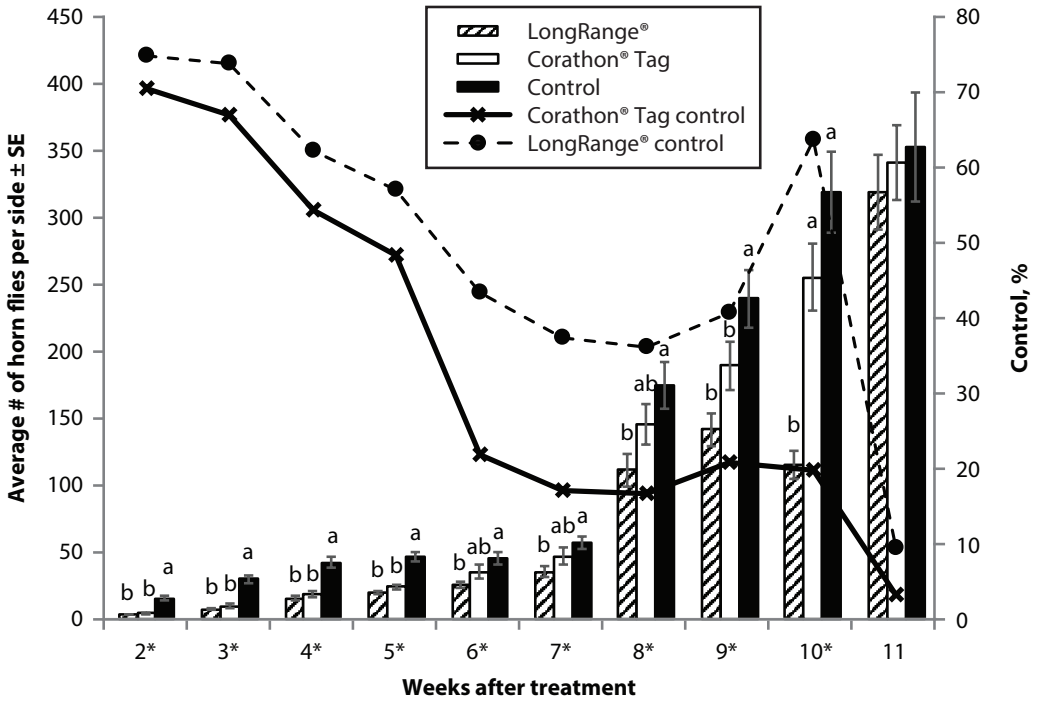
Horn Fly Control and Growth Implants are Effective Strategies for Heifers Grazing Flint Hills Pasture

Samantha Trehal

Objective: The objective of this study was to compare LongRange to an insecticidal ear tag for horn fly control and determine the impact of weight performance on stockers when fly control technologies were used in combination with implants versus no implants.

Study Description: Crossbred stockers (n = 301; 587.82 ± 35.36 lb) were completely randomized by initial weight across 15 pastures. Pastures were randomly assigned to three different treatment groups: 1) one insecticide ear tag (Corathon; Bayer Healthcare, Animal Health Division, Shawnee Mission, KS); 2) LongRange injectable (Merial Limited, Duluth, GA); and 3) untreated control group. Within each treatment group, equal number of animals were randomly given either: Ralgro (Merck Animal Health, Madison, NJ), Revalor-G (Merck Animal Health, Madison, NJ), or no implant. Body weights and fecal samples were taken on days 0 and 90. Fly counts began 2 weeks after initial treatment and continued on a weekly basis until the end of the study.



The Bottom Line: The use of LongRange as a fly control technique adequately controls horn flies up to 10 weeks and exhibited the greatest weight performance in stockers (average daily gain: 1.60 lb) when used in combination with Revalor-G.

Beef Cattle Research

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Zelnate on Arrival Could Decrease the Likelihood of Subsequent Pulls in Suspect Bovine Respiratory Disease Complex Cases

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Objective: The purpose of this study was to evaluate the effectiveness of Zelnate, an immune-stimulant at initial processing or as therapy in high risk feeder calves.

Study Description: Heifers (n = 283; initial body weight 520 ± 39 lb) were sorted by body weight and randomly assigned to treatments. Treatments consisted of Zelnate (Bayer Healthcare, Animal Health Division, Shawnee Mission, KS) administered at initial processing. A second population of treatments was generated based on rectal temperature as the animals were visually pulled for illness. Calves that had a rectal temperature of greater than or equal to 104°F at first pull received Baytril 100 (Bayer Healthcare, Animal Health Division, Shawnee Mission, KS) or Baytril 100 and Zelnate. Similarly, calves that did not have a rectal temperature of 104°F were either not treated at all (respiratory observed, no Zelnate) or administered only Zelnate (respiratory observed with Zelnate). Heifers were housed in dirt surfaced pens with 6 pens per treatment and 15 heifers per pen. Heifers were weighed at days 14 and 62.

Second pull percentage by treatment.

	Zelnate treatment combination[1]			
Item	-Z / -Z	-Z / +Z	+Z / -Z	+Z / +Z
Bovine respiratory disease	35	54	44	33
Respiratory observed, no fever cases	44[ab]	50[a]	11[b]	36[ab]

[ab] Means in a row with uncommon superscripts tended to differ P=0.06.
[1]-Z =no Zelnate; +Z=received Zelnate at initial processing.

The Bottom Line: These results suggest that Zelnate used only in combination with metaphylaxis on arrival and not as a component of Bovine Respiratory Disease Complex treatment could decrease the likelihood of additional pulls in suspect Bovine Respiratory Disease Complex cases.

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Route of *Mannheimia haemolytica* and *Pasteurella multocida* Vaccine Administration Does Not Affect Health or Performance of Receiving Heifers

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Objective: The objective of this study was to determine the effects of route of administration of the *Mannheimia haemolytica* and *Pasteurella multocida* fractions of the vaccine regimen on receiving cattle growth performance, health, and mortality.

Study Description: Heifers (n = 388; initial body weight 497 ± 32 lb) were sorted by body weight and randomly assigned to treatments. Treatments consisted of Vista Once SQ (Merck Animal Health, Madison, NJ) given subcutaneously at initial processing (SQTRT) or Vista 5 SQ (Merck Animal Health, Madison, NJ) given subcutaneously plus Once PMH IN (Merck Animal Health, Madison, NJ) administered intranasally at initial processing (INTRT).

Performance and health of cattle vaccinated with VISTA Once SQ given subcutaneously or VISTA 5 SQ given subcutaneously together with ONCE PMH-IN administered intranasally.

Item	Vista 5 SQ and Once PMH IN	Vista Once SQ	SEM[1]	P-value
Initial weight, lb	498	499	1.3	0.77
14-Day performance				
Body weight, lb	534	531	2.8	0.39
Dry matter intake, lb	10.8	11.0	0.13	0.36
Average daily gain, lb	2.53	2.32	0.196	0.29
Gain:feed	0.232	0.212	0.0181	0.25
45-Day performance				
Final weight, lb	593	593	3.9	0.96
Dry matter intake, lb	11.9	12.0	0.13	0.50
Average daily gain, lb	2.06	2.05	0.083	0.83
Gain:feed	0.174	0.171	0.0069	0.66
Health				
1st Pulls	4.1%	3.6%	0.17	0.73
2nd Pulls	0.01%	0.01%	0.008	0.55
Mortality	0%	0.005%	0.0064	1.00

[1]SEM=Standard error of the mean.

The Bottom Line: Route of vaccine administration in cattle experiencing a low disease challenge did not impact performance or health measurements.

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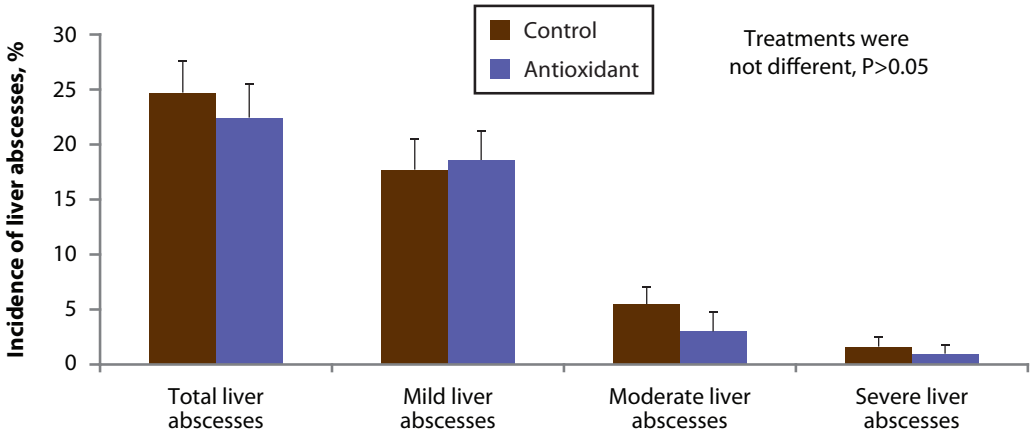
Antioxidant Feeding Does Not Impact Incidence or Severity of Liver Abscesses

Christian Muller

Objective: To evaluate the impact of antioxidants on feedlot performance, carcass characteristics, and incidence and severity of liver abscesses in finishing heifers.

Study Description: Heifers (n = 392, 1060 ± 20.8 lb) were blocked by initial body weight and then randomly assigned to treatments consisting of Control and Antioxidant treatments. The antioxidant treatment consisted of a combination of vitamin C at 0.25 grams and vitamin E at 100 IU per pound of diet dry matter. No Tylan was included in the diets. Animals were placed into 28 dirt-surfaced pens with 14 heifers per pen (14 pens per treatment) and harvested after 112 days on feed.



Effect of antioxidants on liver abscess incidence.

The Bottom Line: Feeding antioxidants had no impact on incidence or severity of liver abscesses.

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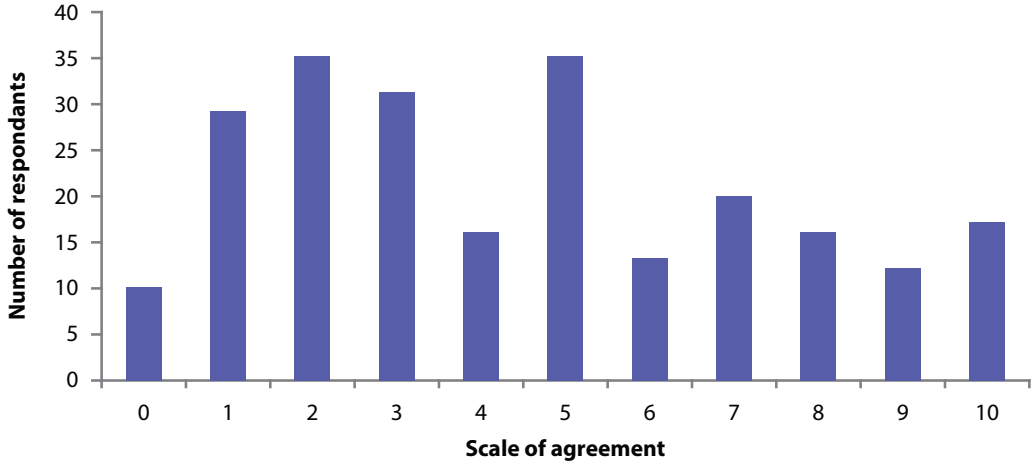
Producer Opinions on Antibiotic Use in the Beef Industry

Tiffany Lee

Objective: A survey was distributed to beef producers in the United States and Canada to explore producer practices and opinions on antibiotic use and antibiotic resistance in the beef industry.

Study Description: A survey exploring antibiotic use and resistance in the beef industry was distributed to beef producers in the United States and Canada. Participants were recruited through public and private beef production websites and publications. The survey asked 26 questions addressing demographics, producers' relationships with veterinarians, antibiotic use on producers' operations, and producer opinions on antibiotic use, antibiotic resistance, and consumer perceptions of antibiotic use in the industry.

Results: Results of the survey show that beef producers are willing to share information about antibiotic use on their production units, including management strategies, veterinary care, and antibiotic use. Producers indicated that they rarely use antibiotics on their farms. The majority of producers use antibiotics according to label directions or veterinary instructions, and feel that withdrawal times are important to observe. Most producers seem to have strong relationships with their veterinarians when it comes to antibiotic use on their operations. Finally, producers surveyed expressed some concern about consumers' understanding of how beef is raised, and how antibiotics are used, regulated, and monitored in the United States.



Results of the question, "On a scale of zero to ten, with zero being 'Strongly Disagree' and ten being 'Strongly Agree' do you believe that resistance to antibiotics is an issue in the beef industry?"

The Bottom Line: This survey shows that beef producers are willing to share information about their production systems and management strategies, including their use of antibiotics. The survey provides valuable insight into the practices and opinions of producers in the beef industry.

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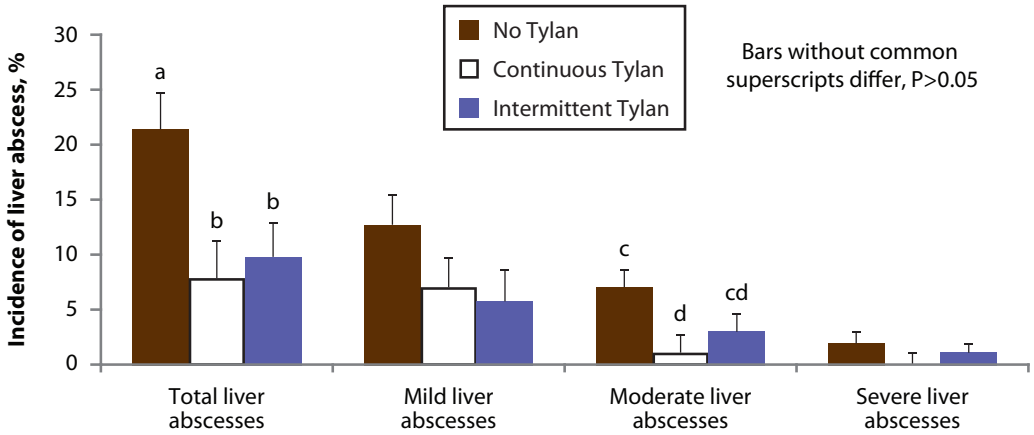
Intermittent Feeding of Tylan Reduces Use of In-Feed Antibiotics While Still Controlling Incidence of Liver Abscesses in Finishing Steers

Christian Muller

Objective: To determine if it is feasible to control liver abscesses in feedlot cattle with intermittent feeding of Tylan, thereby decreasing overall antibiotic use.

Study Description: Treatments included a negative control group (no Tylan throughout finishing period), positive control group (Tylan fed continuously throughout finishing period), and a group that received Tylan on an intermittent basis (1 week on, 2 weeks off). Steers (n = 312, 908 ± 15 lb) were blocked by body weight, randomly assigned to treatment groups, and placed into 24 dirt-surfaced pens with 13 steers per pen. After 119 days on feed cattle were shipped to a commercial abattoir for carcass data collection. Pens were weighed every 28 days and at the end of 119 days the steers were harvested.



Tylan feeding strategy and incidence of liver abscesses.

The Bottom Line: Incidence of liver abscesses was similar for groups fed Tylan continuously and intermittently, but intermittent feeding resulted in a 60% decrease in overall use of in-feed antibiotics.

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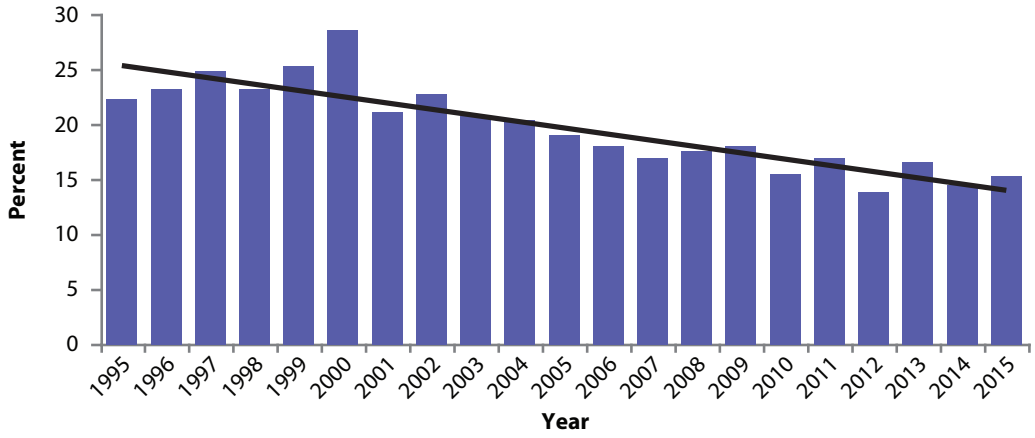
Decline in Brahman Breed Influence of Beef Calf Lots Marketed by Video Auction from 1995 to 2015

Esther McCabe

Objective: The objective was to characterize the potential change in the percentage of lots of beef calves with Brahman influence among calves originating from various regions of the United States marketed through summer video auctions from 1995 through 2015.

Study Description: Information describing factors about lots sold through a livestock video auction service (Superior Livestock Auction, Fort Worth, TX) was obtained from the auction service in an electronic format. These data were collected for all lots of beef calves that were offered in 171 summer sales from 1995 through 2014. There were 80,574 lots (9,685,247 total calves) used in the analyses.

Results: There was a decrease (P<0.0001) in percentage of lots with Brahman influence in the United States during the 21 years. Percentage of lots with Brahman influence decreased (P<0.0001) in four regions: West Coast, Rocky Mountain/North Central, South Central, and Texas. There was no change (P=0.30, P=0.07, respectively) in percentage of lots with Brahman influence originating from the Coastal (AL, FL, GA, LA, MS, and SC) and Sub-Coastal (AR, KY, NC, TN, VA, and WV) regions.



Percentage of lots of beef calves with Brahman influence marketed in summer via video auction service in the United States from 1995 through 2015.

The Bottom Line: The percentage of lots of beef calves with Brahman influence appears to be decreasing in the United States. It remained unchanged in the Coastal and Sub-Coastal regions where Brahman influenced calves are adapted to warmer, more humid climates.

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Survey of Cattle Feedlot Facilities in the High Plains Region of the United States

Jorge Simroth

Objective: Obtain descriptive data regarding outdoor cattle feeding facilities currently used by feedlots in the High Plains region of the United States.

Study Description: Feedlots were randomly selected from an existing database containing contact information for feedlots located in the High Plains (Texas, Oklahoma, New Mexico, Colorado, Kansas, Nebraska), with a minimum one-time capacity of 5,000 cattle. An individual electronic invitation was sent to feedlots to participate in the study. The survey was divided into 4 categories: general information; shipping and receiving area; cattle feeding pens; and hospital area. The survey was conducted during summer of 2015.

Descriptive data about cattle feedlot facilities of participating feedlots.

Item	≤ 20,000 cattle	> 20,000 cattle	Number of responses	Percent of responses
One-time full capacity (cattle) of feedlot	20	23	43	100
Tub or Bud-Box in processing barn				
Tub	15	17	32	74
Bud-Box	3	5	8	19
Space allowance (ft^2/animal) in finishing pens				
50 to 100	1	3	4	10
101 to 250	12	15	27	66
> 250	6	4	10	24
Bunk space (in/animal) in finishing pens				
6 to 9	6	10	16	38
10 to 12	12	11	23	55
Water space (in/animal) in finishing pens				
< 3	5	5	10	24
3 to 6	5	6	11	27
Don't know	10	9	19	46
Use of shade in finishing pens				
Yes	4	3	7	17
Greatest distance (yd; 1 mi=1,760 yd) from feeding pen to loadout				
< 440	3	0	3	7
440 to 880	5	8	13	32
880 to 1,320	8	4	12	29
1,320 to 1,760	3	7	10	24
> 1,760	0	3	3	7

The Bottom Line: This paper provides a thorough description of outdoor cattle feeding facilities in the High Plains region in the United States to serve as a benchmark for those looking to build a new facility or enhance an existing cattle feedlot.

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Differences in Efficacy Between Gamithromycin, Tilmicosin, and Tulathromycin as Metaphylactic Treatments in High Risk Calves for Bovine Respiratory Disease

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Objective: To compare the efficacy of treating newly received, high-risk feedlot calves with gamithromycin, tulathromycin, and tilmicosin as metaphylactic treatments on health and performance characteristics.

Study Description: Cross-bred heifer calves (n = 572; initial body weight 404 ± 27.4 lb) were used in a randomized complete block design to evaluate the effects of 3 different metaphylactic treatments for Bovine Respiratory Disease in high risk calves upon arrival at the feedlot. The treatments administered consisted of one of the three following antibiotics: 1) tulathromycin (1.13 mg/lb; 192 calves); 2) tilmicosin phosphate (5.99 mg/lb; 193 calves); or 3) gamithromycin (2.72 mg/lb; 194 calves). Thirty pens were filled with approximately 19 to 20 heifers; a total of 572 cattle were used in this study. Individual weights were recorded on day 0 and pen weights recorded at the end of the trial on days 56 to 60. Pen served as the experimental unit. Individual animal health was assessed daily throughout the study.

Comparative health effects of metaphylactic treatments on newly received, high-risk feedlot calves on mortality, morbidity, and retreatments.

	Treatment[1]				95%	
Item	Tulathromycin	Tilmicosin	Gamithromycin	Risk Ratio	Confidence Interval	P
Number of cattle	192	193	194			
Mortality	2 (1.0%)		3 (1.5%)	0.67	-3.34-2.34	0.72
	2 (1.0%)	3 (1.6%)		0.67	-3.36-2.31	0.71
		3 (1.6%)	3 (1.5%)	1.01	-2.81-2.86	0.99
Morbidity						
1st treatment	10 (5.2%)		25 (12.8%)	0.40	9.30-19.95	0.05
	10 (5.2%)	28 (14.6%)		0.36	-0.17-10.48	0.02
		28 (14.6%)	25 (12.8%)	1.13	7.47-18.11	0.62
2nd treatment	0 (0.0%)		3 (1.5%)	-	-3.79-0.79	0.19
	0 (0.0%)	5 (2.6%)		-	-4.85-0.27	0.03
		5 (2.6%)	3 (1.5%)	1.68	-1.23-3.35	0.35

[1] Tulathromycin (1.13 mg/lb), Tilmicosin (5.99 mg/lb), and Gamithromycin (2.72 mg/lb).

The Bottom Line: There may be differences between antimicrobials with respect to effectiveness in suppressing bovine respiratory disease when used as a mass medication immediately upon arrival.

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Prevalence of Horns in a Pen Does Not Affect Incidence of Carcass Bruising in Feedlot Cattle

Maggie Youngers

Objective: To evaluate the effect of horn prevalence within groups of slaughter animals and the incidence of bruising on the carcasses of those same cattle.

Study Description: Carcasses from beef cattle (n = 4,287; 27 lots) originating from 13 different feedlots in Texas and Kansas were observed at a commercial abattoir in southwest Kansas. The population included steers, heifers, and a combination of Holstein and beef breeds. Observations were made over 3 separate days and data collections took place during February, March, and December of 2014. All cattle were evaluated for presence or absence of horns, and horns were measured for length and diameter. Measurements included the length of the longest horn from base to tip and the tip-to-tip distance between the tips of both horns. Prevalence of horns was determined by dividing the total number of horned cattle within each lot by the total number of all cattle in the same lot. Carcasses were subsequently evaluated for presence and location of bruising after the hides had been completely removed. Bruise location and severity were scored on each carcass. Prevalence of bruising within a lot was determined by dividing the number of cattle in a lot with bruises by the total number of cattle in the lot. Lot number, horns (yes or no), and harvest date data were evaluated as categorical responses using the GLIMMIX procedure of SAS and a binomial distribution was assumed. A simple linear regression using the PROC REG procedure of SAS was used to evaluate the prevalence of bruises versus the prevalence of horns. Lot was the experimental unit and significance was determined at $P \leq 0.05$.

Descriptive statistics of bruised and horned carcasses by lot (n = 27) for 4,287 beef cattle harvested at a single packing plant in southwest Kansas.

Item	Average	Minimum	Maximum	Standard deviation
Horned carcasses, %[1]	7.7	0	26.5	7.4
Bruised carcasses, %[2]	55.2	0	98.0	23.2

[1] Percentage of cattle with horns per lot.
[2] Percentage of bruised carcasses per lot.

The Bottom Line: The current study did not find a relationship between the prevalence of horned cattle within a lot and subsequent prevalence of carcass bruising within those same lots. The most prevalent location of bruises within these data were along the top of the animals' backs indicating other likely sources of bruising.

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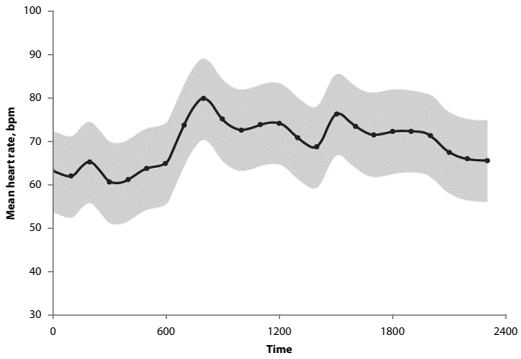
Twenty-four Hour Holter Monitoring in Finishing Cattle Housed Outdoors

Dan Frese

Objective: To determine normal Holter monitor registrations including heart rate, rhythm, number of ventricular premature complexes, and atrial premature complexes in unrestrained finishing Angus steers.

Study Description: Twenty-seven (1,116 ± 12.1 lb) 15- to 17-month-old Angus steers were used to evaluate clinical examination, complete blood count, and serum biochemical analysis. Cattle were determined to be disease-free based on normal physical examinations and blood count and serum chemistries. In addition, tissue histopathology was determined to be normal following euthanasia (27 days after Holter recordings). A lightweight Holter monitor was used in an outdoor environment. Blood samples for serum chemistry and complete blood count were collected on all study animals on days 11 and 16 for blocks 1 and 2, respectively. Silver/silver chloride electrodes were applied to five vertically aligned locations just caudal to the forelimbs. The software identified individual heart beats as normal, abnormal, or artifact. Portions of the recording marked as artifact were excluded from the analysis. After evaluation, software output results were compiled into hourly intervals.



Left: Picture of Holter monitor apparatus applied to steer. Right: Mean heart rate and 95% confidence interval over 24 hours for finishing steers equipped with Holter monitor apparatus.

The Bottom Line: Based on the data from this study, atrial premature complexes are common, ventricular premature complexes are uncommon, and simple second degree atrioventricular block is a variable arrhythmia noted in clinically normal cattle. In addition, instances of simple second degree atrioventricular block were noted in the steers in this study, likely secondary to hypervagotonia. Cattle heart rhythms follow patterns similar to other species with slower rates during the evening and night hours, with higher rates in the morning and declining into the afternoon.

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Water Intake in Growing Beef Cattle can be Measured Concomitantly with Feed Intake

Cashley Ahlberg

Objective: Measure daily water intake of growing beef steers and estimate the minimum test duration to collect water intake phenotypes in beef cattle.

Study Description: Water intake was measured on four groups of crossbred beef steers (n = 459) over a three-year period. Average intakes for each animal were computed for increasingly large test durations (7, 14, 21, 28, 35, 42, 49, 56, 63, or 70 days) to determine the optimum test duration for water intake. Depending on the desired stringency of data collection, minimum test duration can be determined when phenotypic correlations were above 0.90, 0.95, or 0.99 for shortened periods as compared to 70 days.

Results: Although steers drink more water during the summer than during the winter, water intake is highly variable. Additionally, our results indicate that to achieve a minimum phenotypic correlation of 0.90, 0.95, or 0.99, the minimum test duration for water intake should be 35, 49, or 56 days, respectively.

Average daily water intake (n = 4569) over a three year period.

		Water intake (% body weight/day)[1]				Daily water intake (gal)			
Group[2]	N	Mean	STD[3]	Min	Max	Mean	STD[3]	Min	Max
1	118	10.79[a]	1.97	5.84	16.45	10.70	2.12	5.68	17.51
2	115	6.90[b]	1.13	4.46	11.89	7.21	1.44	3.69	11.53
3	117	8.55[c]	1.42	5.95	13.18	9.47	1.75	6.27	15.64
4	106	11.39[d]	3.17	7.67	24.23	13.13	3.48	8.47	27.11
All[b]	456	9.38	2.71	4.46	24.23	10.13	2.20	6.07	17.95

[1]Daily water intake as a percent of mid-test body weight (lb).
[2]Daily water intakes were taken for group 1 summer 2014, group 2 winter 2014, group 3 summer 2015, group 4 summer 2016, and all is the average of the four groups.
[3]Standard deviation.
[a,b,c,d]Means within a column that do not have common superscripts differ (P<0.05).

The Bottom Line: Because the test duration and equipment necessary is similar for both traits, water and feed intake phenotypes can be collected simultaneously, which would allow the collection of water intake data without significantly extending test duration.

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Beef Cattle Research

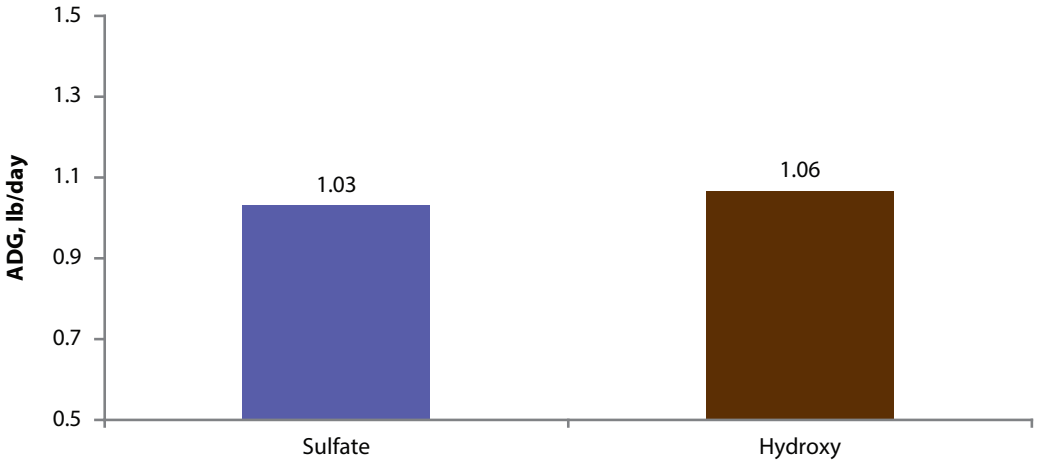
Feeding a Novel Trace Mineral at Lower Levels to Grazing Stocker Cattle Does Not Impair Performance

Callie S. Weibert

Objectives: The purpose of this grazing study was to evaluate the effects of feeding zinc, copper and manganese from either a sulfur or hydroxy mineral source.

Study Description: Heifers (n = 276; initial body weight 645 lb) were sorted by body weight and randomly assigned to one of two pasture treatments in a 90-day grazing study that was initiated in May of 2015. The SULFATE and HYDROXY treatments consisted of a free-choice mineral supplement that contained the trace minerals zinc, copper and manganese from sulfate or hydroxy (IntelliBond®) sources. The hydroxy minerals were fed at a 40% reduced level. Calves were weighed at the beginning and end of the study, and mineral intake and daily gain were determined for each paddock of calves.

Results: There were no significant differences in average daily gain or mineral intake during the 90 day grazing trial. Heifer daily gains based on previous years' research results were sub-par, which was likely the result of the degree of fleshiness created during the receiving phase and initial body size when introduced to pasture.



Performance data for heifers supplemented with sulfate or hydroxy trace minerals while grazing Flint Hills pasture.

The Bottom Line: Heifers provided the hydroxy free-choice mineral supplement with the trace minerals zinc, copper, and manganese formulated to 40% of the sulfate supplement performed similarly to the sulfate-based mineral supplement.

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Evaluation of Trace Mineral Sources on Newly Arrived Stocker Cattle

Callie S. Weibert

Objectives: The purpose of this study was to evaluate the effects of feeding zinc, copper and manganese from different mineral sources.

Study Description: Heifers (n = 280; initial body weight 511 lb) were sorted by body weight and randomly assigned to treatments. Treatments consisted of supplemental zinc, copper and manganese from sulfate, organic and hydroxy forms. Heifers were housed in dirt surfaced pens with 6 pens per treatment and 15 heifers per pen. Heifers were weighed at day 14 and 45.

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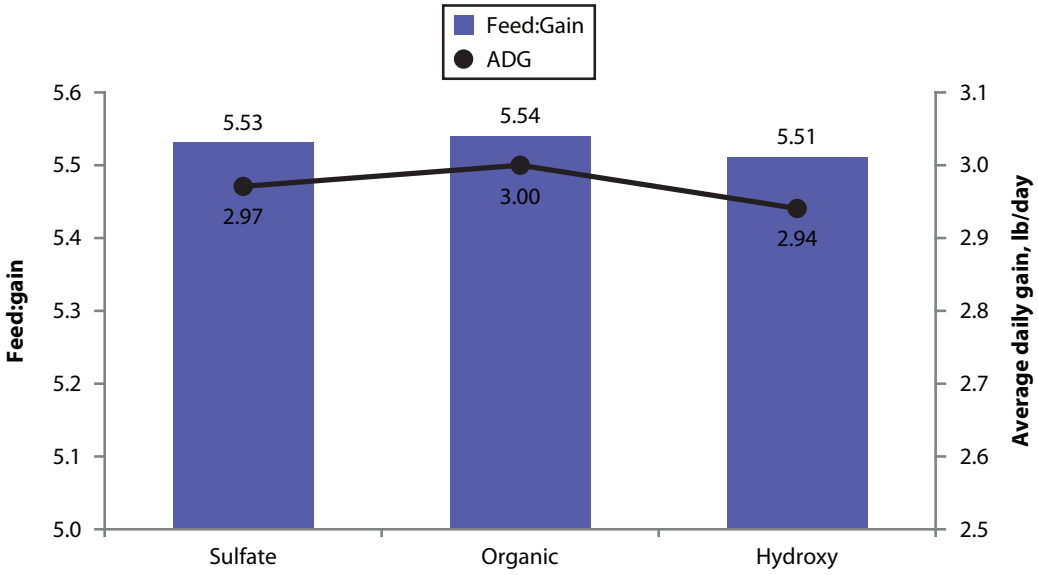

Sources of trace mineral for newly arrived stocker cattle

The Bottom Line: Sources of zinc, copper and manganese provided as a sulfate, organic or hydroxy form had no effect on daily gain or feed efficiency of heifers fed during a 45 day receiving period.

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Feeding Nucleotides with Corn Germ Meal or Dried Corn Distillers Grain Does Not Promote Growth Performance of Receiving and Growing Calves

Monika L. Schilling

Objectives: To determine: 1) the effects of corn germ meal in comparison to dried corn distillers grain, and 2) the effects of a nucleotide additive on growth performance, by receiving and growing cattle.

Study Description: Two hundred thirteen heifers were blocked by source, stratified by arrival weight and randomly assigned one of six treatments: 1) corn germ meal with 0 g/heifer daily nucleotide additive (corn germ meal 0); 2) corn germ meal with 2 g/heifer daily nucleotide additive (corn germ meal 2); 3) corn germ meal with 4 g/heifer daily nucleotide additive (corn germ meal 4); 4) dried corn distillers grain with 0 g/heifer daily nucleotide additive (dried corn distillers grain 0); 5) dried corn distillers grain with 2 g/heifer daily nucleotide additive (dried corn distillers grain 2); and 6) dried corn distillers grain with 4 g/heifer daily nucleotide additive (dried corn distillers grain 4). Heifers were individually weighted on days 0, 28, 56, 84, and 85.

Effects of the addition of a nucleotide additive to diets containing dried distillers grains or corn germ meal on beef heifer growth performance.

	Nucleotide additive,[1] g/day									
	Corn germ meal			Dried corn distillers grain				P-value		
Item	0	2	4	0	2	4	SEM	BP[2]	NA-L[3]	NA-Q[4]
Experiment 1										
Initial body weight, lb	578	577	575	577	576	576	35	0.78	0.20	0.72
Final body weight, lb	784	777	784	770	791	721	15	0.88	0.33	0.72
Dry matter intake, lb/day										
days 0 to 84	20.7	19.8	20.5	19.6	20.1	20.4	1.8	0.55	0.65	0.56
Average daily gain, lb										
days 0 to 84	2.45	2.38	2.49	2.29	2.56	2.51	0.18	0.88	0.28	0.70
Gain:feed										
days 0 to 84	0.12	0.12	0.12	0.12	0.13	0.12	0.01	0.34	0.41	0.28

[1] Nucleotide (NA); PSB Complex, DSS Global, Chicago, IL.
[2] BP indicates byproduct effect.
[3] NA-L indicates nucleotide additive linear effect.
[4] NA-Q indicates nucleotide additive quadratic effect.

The Bottom Line: Corn germ meal can be used as an alternative to dried corn distillers grain, which it has similar growth performance in receiving and growing cattle. Feeding a nucleotide additive to newly arrived beef heifers has no effects on growth performance.

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Receiving Stocker Cattle Performance Is Similar with Either Corn or Sorghum Wet Distillers Grains

Angela C. Vesco

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Objective: The objective of this study was to evaluate the effect of corn and sorghum wet distillers grains on performance of receiving stocker calves.

Study Description: Crossbred steers (n = 263; 644 lb initial body weight) were obtained from a single source in central Texas for a 90 day feeding trial. Steers were assigned to one of four treatments: 1) cracked corn with wet corn distillers grains; 2) cracked corn with wet sorghum distillers grains; 3) rolled sorghum with wet corn distillers grains; and 4) rolled sorghum with wet sorghum distillers grains .

Effects of wet corn or sorghum distillers grains with corn or sorghum grain on gain, intake, and efficiency in crossbred steers.

	Cracked corn		Rolled sorghum			P-value		
Item	Wet corn distillers grain	Wet sorghum distillers grain	Wet corn distillers grain	Wet sorghum distillers grain	SEM[1]	Grain	Wet distillers grain type	Grain × Wet distillers grain type
Number of pens	6	6	6	6				
Number of animals	66	66	66	66				
Days on feed	90	90	90	90				
Initial body weight, lb	651	640	640	645	7.02			
Final body weight, lb	955	957	946	959	6.16			
Dry matter intake, lb/day								
days 0 to 21	17.80	17.62	17.58	17.67	0.59	0.88	0.94	0.82
days 0 to 90	27.57	26.77	27.02	27.30	1.08	0.99	0.79	0.57
Average daily gain, lb								
days 0 to 21	3.56	3.87	3.96	3.67	0.24	0.68	0.95	0.23
days 0 to 90	3.37	3.45	3.48	3.48	0.07	0.37	0.49	0.69
Gain:feed								
days 0 to 21	0.2	0.22	0.23	0.21	0.01	0.72	0.93	0.22
days 0 to 90	0.12	0.13	0.13	0.13	0.01	0.59	0.64	0.48

[a,b,c,d] Within a row least squares means without a common superscript differ (P≤0.05).
[1] Standard error of the mean.

The Bottom Line: Sorghum wet distillers grains can be fed at the same level as wet corn distillers grains to growing stocker steers and will produce similar responses in terms of gain, intake, and efficiency.

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High Energy Digestible Fiber-based Diets Improve Efficiency in Growing Heifers

Tyler J. Spore

Objective: The objective of this study was to evaluate the effects of dietary energy and intake on performance and health of newly received stocker calves.

Study Description: Heifers (n = 370; initial body weight 491 ± 37 lb) were sorted by weight and assigned to pens that were randomly assigned treatments. Treatments consisted of four diets offering 45, 50, 55, and 60 Mcal net energy for gain/100 lb feed. The 45 treatment was fed *ad libitum* and the other three treatments were restricted based on those intakes such that the 50, 55, and 60 treatments received 95, 90, and 85% of the 45 treatment daily intake, respectively. The trial lasted 55 days including a 14-day period in which, the 45 treatment was fed to all animals to equalize gut-fill. All four diets were formulated to contain 40% wet corn gluten feed on a dry matter basis. Heifers were housed in dirt floor pens with eight pens per treatment. Animals were weighed on days 0, 14, 27, 41, and 55.

Effects of dietary net energy for gain and intake on newly arrived heifer performance and health.

	Treatment[1]				
Item	45/100	50/95	55/90	60/85	SEM[2]
Day 0 body weight, lb	490	493	490	491	5.37
Day 55 body weight, lb	614	617	616	623	8.21
Final average daily gain, lb/day	2.26	2.25	2.29	2.40	0.11
Final feed:gain	6.48[b]	6.11[b,c]	5.65[c,d]	5.22[d]	0.22
Day 55 dry matter intake, lb/day	14.51[b]	13.51[c]	12.88[c,d]	12.51[d]	0.46
Final dry matter intake, % of body weight	2.63[b]	2.43[c]	2.33[c,d]	2.25[d]	0.06

[1]First number is net energy for gain in Mcal/100 lb dry matter. Second number is dry matter intake as percent of 100.
[2]SEM=standard error of the mean.
[bcd]Means within a row with uncommon superscripts differ (P<0.05).

The Bottom Line: Limit feeding higher energy diets based primarily on digestible fiber can offer a more efficient approach to feeding newly received stocker calves.

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Supplemental Zinc Sulfate Interacts with Optaflexx in Feedlot Heifers

Cadra Van Bibber-Krueger

Objectives: The purpose of this study was to evaluate growth, carcass characteristics, and plasma urea nitrogen concentrations in finishing heifers supplemented with Optaflexx in conjunction with increased concentrations of zinc.

Study Description: Heifers (n=156; initial body weight 1,162 lb) were sorted by body weight and randomly assigned to treatments. Treatments consisted of heifers supplemented with Optaflexx (0 or 200 mg/animal daily) and zinc (30 or 100 ppm) as zinc sulfate. Pens contained 3 heifers per pen with 13 pens per treatment. Blood was collected days 0 and 36 for urea nitrogen analysis. Heifers were fed Optaflexx for 42 days then harvested after 43 days. Harvest data were collected after slaughter.

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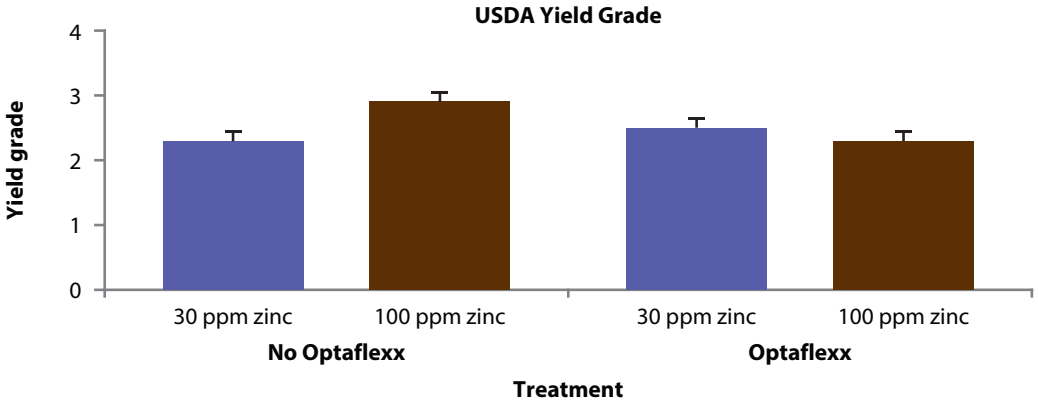

The Bottom Line: Supplementing increased concentrations of zinc sulfate to finishing heifers had little impact on feedlot performance and plasma urea nitrogen concentration; however, muscle and fat deposition may be altered when fed in combination with Optaflexx.

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Particle Size of Dry-rolled Corn Affects Starch Digestibility but Not Feedlot Performance

Erin Schwandt

Objective: To evaluate the effects of dry-rolled corn particle size on animal performance, carcass traits, and starch digestibility in feedlot finishing diets containing 20% wet distiller's grains on a dry matter basis.

Study Description: Cross-bred yearling steers (n = 360; initial body weight = 871 ± 79.0 lb) were used in a randomized complete block design to evaluate the effects of dry-rolled corn particle size in diets containing 20% wet distillers grains on feedlot performance, carcass characteristics, and starch digestibility. Dietary treatments were coarse dry-rolled corn (0.192 in.), medium dry-rolled corn (0.148 in.), fine dry-rolled corn (0.093 in.), and steam-flaked corn (27 lb/bu). Steers were transitioned to the finishing diet over a 23-day period following arrival using a series of 4 diets including: starter (days 1-7), step-1 (days 8-14), step-2 (days 15-23), finisher without ractopamine hydrochloride (days 24-113), and finisher with ractopamine hydrochloride (days 114-142). Steam-flaked corn was used in the starter and step-up diets and all diet changes during the step-up program were simultaneous for all pens and all treatments. Optaflexx was fed to all treatments the final 29 days in the feedlot at 13.65 mg/lb dry matter basis, providing approximately 300 mg/head/day.

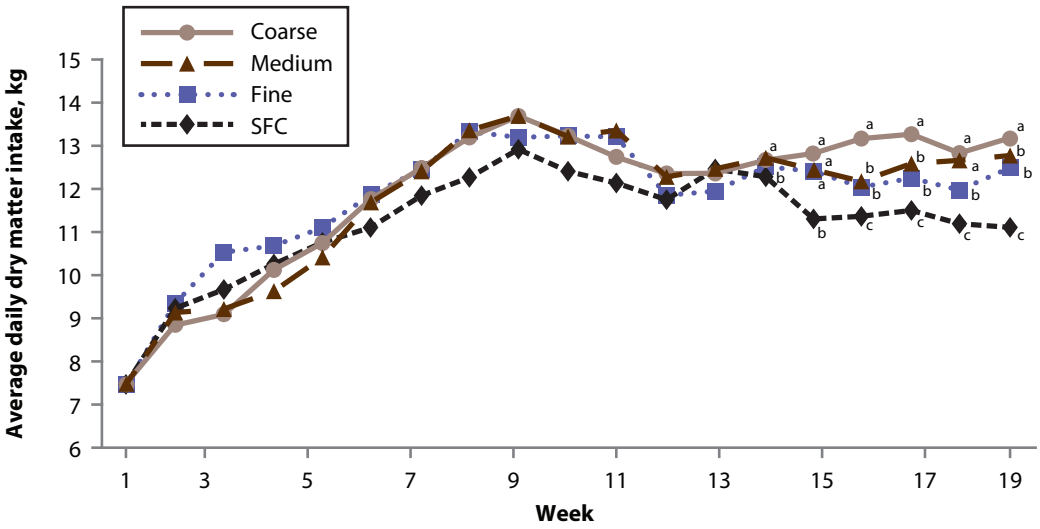

Figure 1. Weekly average daily dry matter intake by treatment for cattle fed coarse dry-rolled corn (0.192 in.); medium dry-rolled corn (0.148 in.); fine dry-rolled corn (0.093 in.); and steam-flaked corn (27 lb/bu). Treatment by week interaction was significant (P<0.05). For any given week, means without a common superscript are different (P<0.05). Standard error of the least squares mean=0.501.

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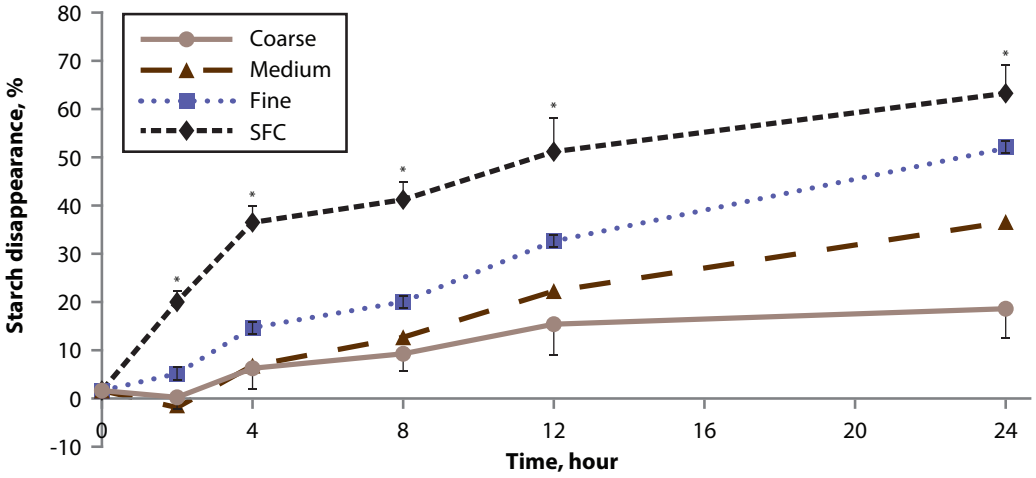

Figure 2. The disappearance of starch from Dacron bags suspended in the rumen for 0, 2, 4, 8, 12, or 24 hours. Treatments were coarse dry-rolled corn (0.192 in.); medium dry-rolled corn (0.148 in.); fine dry-rolled corn (0.093 in.); and steam-flaked corn (27 lb/bu). Treatment (P<0.01), time (P<0.01), and the treatment by time interaction (P<0.01) effects for *in situ* starch disappearance were significant. After 24 hours incubation, *in situ* starch disappearance was approximately 18.0, 36.2, 52.0, and 63.1% (standard error of the least squares mean=5.44) for the coarse, medium, and fine dry-rolled corn, and steam-flaked corn treatments, respectively.

The Bottom Line: These results indicate improved ruminal starch digestibility, reduced fecal starch concentration, and reduced dry matter intake with decreasing dry-rolled corn particle size in feedlot diets containing 20% wet distillers grains on a dry matter basis.

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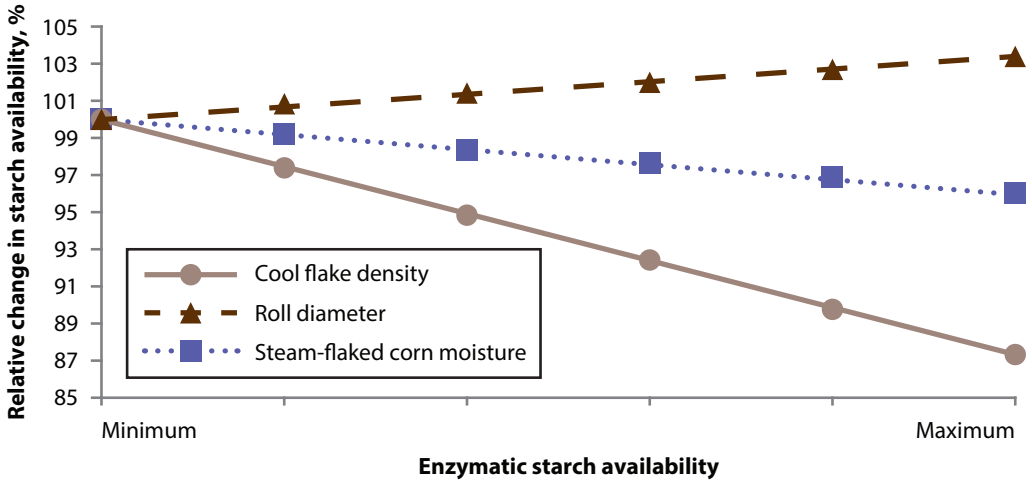
Flake Density, Roll Diameter, and Flake Moisture All Influence Starch Availability of Steam-Flaked Corn

Erin Schwandt

Objective: To evaluate starch availability of steam-flaked corn comparing roll dimensions and flake densities among flaking systems and feedyards, and to provide information on equipment utilized, steam-flaked corn flaking procedures, and to define current manufacturing practices of steam-flaking in commercial feedlot operations.

Study Description: Commercial feedlots (n = 17) were asked to participate in a survey to evaluate steam-flaked corn manufacturing practices implemented, equipment utilized, and parameters targeted to measure flake quality. Manufacturing practices evaluated included dry corn moisture, grain water addition, tempering time, steaming time, steam-cabinet temperature, mill electrical load, steam-conditioned corn moisture content, steam-flaked corn moisture content, and flake thickness. Equipment evaluated included roll size, steam-cabinet dimensions, and capacity. Flake quality parameters included hot and cooled steam-flaked corn flake density, volumetric flake weight, and starch availability samples. Samples of steam-conditioned corn and steam-flaked corn were collected from each flaker (n = 49) within each feedlot. Flake density was measured on hot (immediately from below the rolls) and cooled flakes; and volumetric weight was measured only on cooled flakes. Starch availability was measured using enzymatic hydrolysis.



Multiple linear regression equation illustrating the relative effects of starch availability for the complete range of values within dataset for significant variables: cooled flake density, roll diameter, and steam-flaked corn moisture for 17 commercial feedyards surveyed in Nebraska, Kansas, Colorado, Texas, New Mexico, Arizona, and California. (Enzymatic = 119.72) - (1.22 × steam-flaked corn moisture) - (2.42 × Cooled flake density) + (0.47 × roll diameter). All variables but one were held constant at the mean of the data collected, and values for the third variable were entered from the minimum to the maximum values within the dataset.

The Bottom Line: Manufacturing equipment and quality control measures vary greatly across commercial feedyards in the United States. Within each feedyard, each roll set should be managed as an individual unit given that no two units are the same. This study has identified cooled flake density, steam-flaked corn moisture, and roll diameter to be significant variables contributing to enzymatic starch availability in commercial feedyards located in the United States.

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A Survey of Dry Processed Corn Particle Size and Fecal Starch in Midwestern U.S. Feedlots

Erin Schwandt

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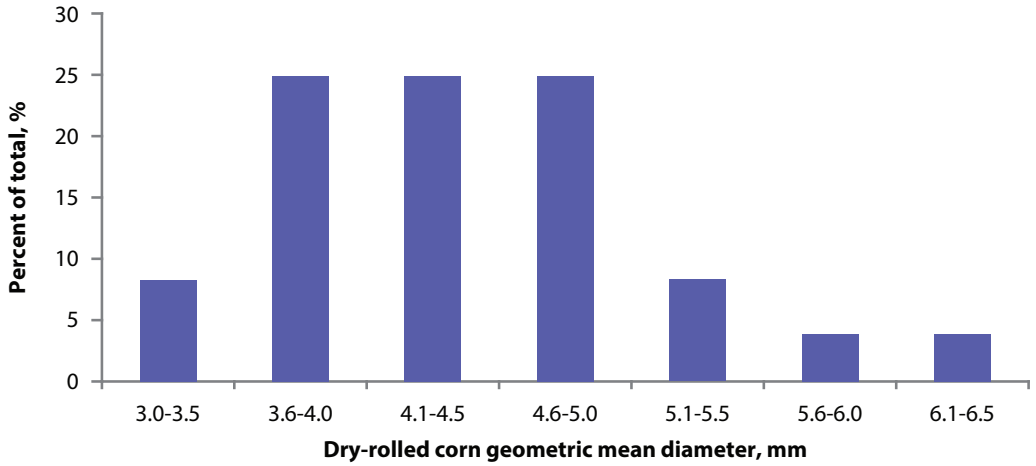
Objective: To provide the feedlot industry with an indication of average particle size distribution from current manufacturing practices of dry processed corn, fecal starch content, and co-product and roughage inclusion levels in Midwestern feedlots.

Study Description: Feedlots (n = 35) were asked to participate in a survey to evaluate dry-rolled corn processing practices, processed corn particle size distribution, and fecal starch content in finishing cattle. Feedlots were located in the central U.S. states of Kansas, Nebraska, South Dakota, Minnesota, Colorado, and Iowa. Samples of dry processed corn and finishing diet were collected from each feedlot, along with samples of freshly voided feces collected from 3 pens of finishing cattle with samples collected from 3 animals per pen with a total of 9 samples per feedlot composited. The survey was conducted from November 2013 through March 2014. Sample collection included a dry processed corn sample, diet sample, and fecal samples. Dry processed corn samples were collected from the ground corn storage pile. Grain samples (~17 oz) were typically collected from 3 locations in the pile from approximately 5.9 in deep. If corn was ground directly into the mixer truck (n = 2), the sample was collected in the mixer truck during loading. Diet samples (~17 oz) were collected across 5 locations in the bunk immediately after feeding. Diet samples (n = 5 per pen) were placed in a 20 quart bucket, hand-mixed, and poured onto a clean concrete surface. Piles were quartered, and 2 aliquots of diet were subsampled from 2 opposite quarters, placed in a plastic bag and frozen. Diet samples were analyzed at a commercial lab for moisture, dry matter, crude protein, acid detergent fiber, neutral detergent fiber, fat, calcium, phosphorus, potassium, and magnesium.



Average particle size of dry-rolled processed corn for 35 feedlot operations.

The Bottom Line: These results do not directly compare dry-rolled corn particle size and fecal starch concentration, but the combined results suggest that dry-rolled corn particle size may affect total tract starch digestion. Diets formulated with a higher co-product level could include more finely processed grain in the diet. Co-products fed at higher levels could dilute the concentration of rapidly fermentable starch found in finely processed grain, thus achieving greater total tract starch digestion without affecting rumen function.

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Length of Aging has a Greater Effect than Lactic Acid Treatment on Color Stability of Beef Chuck Muscles

Garrett McCoy

Objective: The objective of this study was to determine the effect of a lactic acid carcass wash on the color stability of beef chuck rolls.

Study Description: Beef chuck rolls were collected from a commercial abattoir, treated with water or lactic acid, vacuum packaged and randomly assigned to an aging period (0, 14, 21, and 28 days) in the dark at 35-39°F during which, external color was measured. At the conclusion of the aging period, chucks were cut into steaks and used for a 7-day simulated retail display. During this display, a trained sensory panel evaluated redness and percent discoloration in addition to instrumental color measurements (lightness, redness, and yellowness).

Mean discolorations scores for *complexus* and *serratus ventralis* muscles from beef chuck rolls with different aging times and treatments.

	Aging time				
Discoloration[1]	Day 3	Day 14	Day 21	Day 28	SEM[2]
complexus					
Water	37.8^{az}	39.5^{az}	37.2^{az}	43.1^{az}	3.41
Lactic acid	36.9^{bz}	45.5^{abz}	43.6^{abz}	46.1^{az}	3.41
serratus ventralis					
Water	32.7^{bz}	39.1^{az}	38.2^{az}	43.7^{az}	3.41
Lactic acid	33.9^{bz}	45.1^{az}	43.9^{az}	45.9^{az}	3.41

[1]Percent discoloration.
[2]Standard error of the mean.
^{ab}Means within a row with different superscripts differ (P<0.05).
^{z}Means within a column with different superscripts differ (P<0.05).

The Bottom Line: The application of lactic acid washes negatively impacts the color of the treated chuck roll surface, resulting in a less red external color. However, the treatment does not impact the redness or discoloration of steaks cut from treated chuck rolls. Length of aging appears to have the greatest effect on color stability of beef chuck muscles under retail display conditions.

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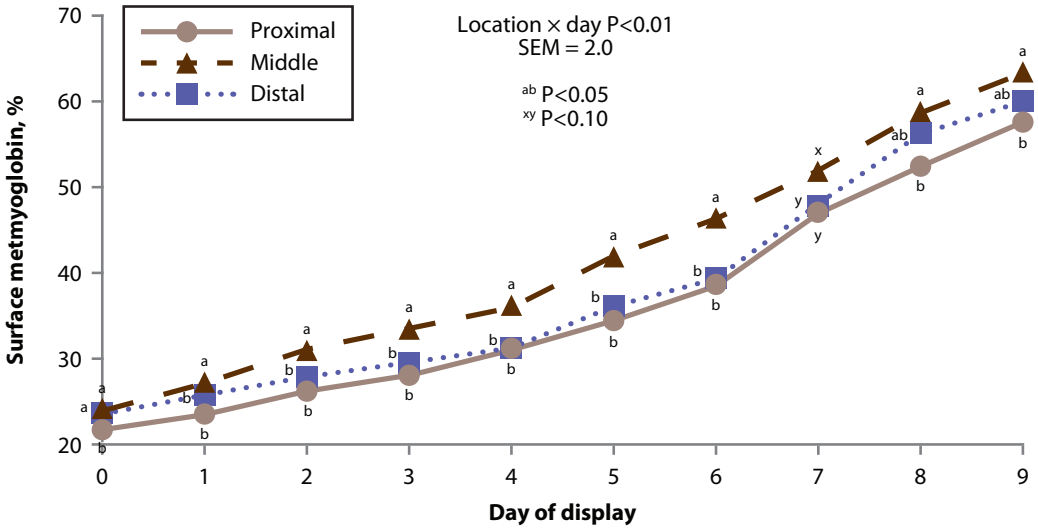
Steak Location Within the *Semitendinosus* Muscle Impacts Metmyoglobin Accumulation on Steaks During Retail Display

Kelsey Phelps

Objective: The objective of this study was to examine effects of steak location on muscle fiber type distribution and metmyoglobin accumulation of *Semitendinosus* (eye of round) steaks.

Study Description: *Semitendinosus* muscles (n = 20; Institutional Meat Purchase Specifications 171C) purchased from a commercial abattoir were wet aged in a vacuum bag for 22 days at 35°F. Progressing from the proximal to distal end, each *Semitendinosus* was fabricated into twelve 1-in thick steaks. Steaks 1-4 were designated proximal, 5-8 were designated middle, and 9-12 were designated distal. Steaks were displayed under simulated retail display conditions with fluorescent lighting and subjected to daily objective and steak surface discoloration analyses and were also analyzed for muscle fiber type.



Surface metmyoglobin percentage of *Semitendinosus* steaks under simulated retail display captured using a Hunter Lab Miniscan.

The Bottom Line: Steaks fabricated from middle of the eye of round discolor at a faster rate than steaks from the proximal or distal locations. Retailers may want to display steaks from this location during times the case is turning over more quickly.

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Brahman Genetics Negatively Impact Protein Degradation and Tenderness of *Longissimus Lumborum* Steaks, but do Not Influence Collagen Cross-Linking

Kelsey Phelps

Objective: The objective of this study was to evaluate the effect of Brahman genetics on protein degradation, collagen cross-linking, and meat tenderness of strip loin steaks.

Study Description: Steers (n = 131) from the University of Florida Multi-breed Herd born in 2012 and 2013 were classified into four breed categories based on percentage of Brahman genetics. Steers were harvested at a 0.5 in. of back fat and following chilling, a 3-in. loin roast was collected and wet-aged in a vacuum bag until 14 days postmortem. Following aging, each roast was fabricated into 3 steaks for objective tenderness analysis, trained sensory panel analysis, and protein degradation and collagen analyses.

The effect of Angus and Brahman genetics on objective and subjective measures of cooked meat tenderness of strip loin steaks wet-aged in a vacuum bag 14 days postmortem.

	Angus/Brahman,[1] %					P-value	
Item	100/0	62.5/32.5	50/50	0/100	SEM	Linear	Quadratic
Objective measures							
Shear force, lb	37.22	38.23	40.78	43.46	2.47	0.01	0.86
Cooking loss, %	15.73	13.80	15.39	14.21	1.43	0.14	0.54
Subjective measures[2]							
Tenderness	6.30	5.69	6.05	5.30	0.18	0.01	0.81
Juiciness	6.27	5.92	5.99	5.84	0.12	0.01	0.22
Beef flavor	5.75	5.70	5.87	5.68	0.09	0.56	0.35
Connective tissue	6.76	6.49	6.64	6.11	0.21	0.01	0.49
Off-flavor	5.86	5.85	5.85	5.87	0.05	0.84	0.73

[1] Steers (n = 131) were classified into 4 categories based on percentage of Angus and Brahman genetics. The breed groups were: 100% Angus/0% Brahman, 62.5% Angus/ 37.5% Brahman (Brangus), 50% Angus/50% Brahman, and 100% Angus/0% Brahman.

[2] Tenderness, juiciness, beef flavor, and connective tissue (1 = extremely tough, extremely dry, extremely bland, abundant; 8 = extremely tender, extremely juicy, extremely intense, none), off-flavor (1 = extremely intense; 6 = none).

The Bottom Line: Decreases in tenderness of strip loin steaks from steers with greater percentages of Brahman genetics is likely due to reduced protein degradation and is possibly related to solubility of collagen.

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CATTLEMEN'S DAY 2017

BEEF CATTLE RESEARCH

Tenderness, Juiciness, and Flavor Contribute to the Overall Consumer Beef Eating Experience

Lindsey Drey

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Objective: The objective of this report was to evaluate the relative contribution of tenderness, juiciness, and flavor to overall consumer eating satisfaction.

Study Description: Data from 11 consumer studies conducted within the past five years were selected to evaluate the effect of tenderness, juiciness, and flavor to overall eating experience. A multivariate regression model was constructed using the sample means to determine the contribution of tenderness, juiciness, and flavor to consumer overall liking scores. The odds and relative risk of an unacceptable overall eating experience were determined based on the acceptability of the three individual sensory traits.

Odds of an unacceptable eating experience based on tenderness, juiciness, and flavor acceptability.

Palatability trait	Odds when trait is acceptable[1]	Odds when trait is unacceptable[2]	Odds ratio[3]	Relative risk[4]
Tenderness	1 in 10	2.2 to 1	20.8	7.2
Juiciness	1 in 9	1.9 to 1	17.1	6.5
Flavor	1 in 15	3.3 to 1	49.0	12.3
Tenderness and juiciness	1 in 15	6.3 to 1	92.0	13.5
Tenderness and flavor	1 in 50	10.3 to 1	516.5	46.8
Juiciness and flavor	1 in 35	8.3 to 1	293.7	32.4
Tenderness, juiciness, and flavor	1 in 93	21.5 to 1	1989.1	89.5

[1]Odds of overall eating experience failing when individual palatability trait is rated acceptable.
[2]Odds of overall eating experience failing when individual palatability trait is rated unacceptable.
[3]Relative increase in odds of unacceptable eating experience when trait is rated unacceptable (i.e. odds of failure are X times greater than when trait is acceptable).
[4]Increased risk of unacceptable eating experience when trait is unacceptable (i.e. overall unacceptable rating is X times more likely than when trait is acceptable).

The Bottom Line: These results indicate the importance and impact of tenderness, juiciness, and flavor on overall eating experience, as well as the significant impact of even a single palatability trait failure on eating experience.

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Marbling Texture Does Not Affect Consumer Preference of Beef Strip Loin Steaks

Kelly Vierck

Objective: The objective of the study was to evaluate the consumer sensory and visual preferences of beef strip loin steaks of varying U.S. Department of Agriculture quality grades and marbling textures.

Study Description: Top Choice, Low Choice, and Low Select strip loins (n = 117) were selected based on a visual marbling texture scale from 1-9, where 1 = fine marbling and 9 = coarse marbling. Steaks were prepared to a medium (160°F) degree of doneness and served to 104 consumers. Each panelist rated each sample for juiciness, tenderness, flavor liking, and overall liking on 3.93 in line scales for nine samples. Panelists also visually rated steaks through a pictorial survey.

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Least squares means for consumer panel ratings[1] of grilled beef strip loin steaks of varying USDA quality grades and marbling texture treatments (n = 104).

Treatment	Tenderness	Juiciness	Flavor liking	Overall liking
Marbling texture				
Fine	66.6	63.8	65.0	67.7
Medium	63.0	60.9	62.1	64.2
Coarse	63.7	61.9	63.3	64.9
SEM[2]	2.2	2.2	1.8	1.8
P-value	0.29	0.53	0.35	0.22
Quality Grade				
Top Choice[3]	64.6[ab]	63.2	64.3[a]	66.1[ab]
Low Choice	67.5[a]	63.7	66.3[a]	68.3[a]
Select	61.2[b]	59.6	59.8[b]	62.4[b]
SEM	2.2	2.2	1.8	1.8
P-value	0.04	0.24	0.01	0.02
Quality Grade × Texture				
P-value	0.51	0.46	0.78	0.62

[1]Sensory scores: 0 = Extremely tough/dry/dislike flavor, 100 = Extremely juicy/tender/like flavor.
[2]SE (largest) of the least squares means.
[3]USDA marbling score of Modest[00] - Moderate[100].
[ab]Least squares means in the same main effect (quality grade or marbling texture) without a common superscript differ (P<0.05).

The Bottom Line: Marbling texture does not affect consumer purchasing choices when color and external fat are removed from steaks. Despite marbling differences, consumers found both USDA Choice samples similar for tenderness, juiciness, flavor, and overall liking.

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Coarse Marbled Beef is Juicier and More Flavorful Than Fine or Medium Marbled Beef

Kelly Vierck

Objective: The objective of the study was to evaluate the effects of marbling texture on trained sensory panel ratings of beef strip loin steaks of three USDA quality grades and three marbling textures.

Study Description: Top Choice, Low Choice, and Select strip loins (n = 117) were selected based on a visual marbling texture scale into fine, medium, and coarse textured groups. Steaks were prepared to a medium (160°F) degree of doneness and served to groups of 8 trained panelists. Each panelist rated samples for initial and sustained juiciness, myofibrillar and overall tenderness, connective tissue amount, and beef flavor intensity.

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Least squares means for trained panel ratings[1] of grilled beef strip loin steaks from three USDA quality grades and three marbling texture treatments.

Treatment	Initial juiciness	Sustained juiciness	Myofibrillar tenderness	Connective tissue amount	Overall tenderness	Beef flavor intensity	Off flavor intensity
Marbling texture							
Fine	61.4[ab]	49.5[b]	74.1	8.8	70.8	39.6[b]	1.7
Medium	60.3[b]	48.5[b]	71.5	8.2	68.4	38.5[b]	1.4
Coarse	65.5[a]	54.5[a]	73.6	9.2	69.8	42.6[a]	1.8
SEM[2]	1.8	2.0	1.6	0.7	1.6	1.1	0.7
P-value	0.04	0.03	0.17	0.55	0.53	0.01	0.88
Quality Grade							
Top Choice[3]	65.8[a]	55.16[a]	74.7	8.3	71.5	42.2[a]	2.0
Low Choice	62.4[ab]	50.6[ab]	73.3	8.2	69.9	40.5[a]	1.3
Select	59.1[b]	46.7[b]	71.2	9.8	67.6	38.0[b]	1.6
SEM	1.8	2.0	1.6	0.7	1.6	1.1	0.7
P-value	0.01	0.003	0.34	0.22	0.18	0.01	0.67
Quality grade × texture							
P-value	0.33	0.38	0.83	0.81	0.89	0.85	0.18

[1]Sensory scores: 0 = Extremely tough/dry/dislike flavor, 100 = Extremely juicy/tender/like flavor.
[2]SE (largest) of the least squares means.
[3]USDA marbling score of Modest[00]-Moderate[100].
[ab]Least squares means in the same main effect (quality grade or marbling texture) without a common superscript differ (P<0.05).

The Bottom Line: Coarse marbled steaks were juicier and had greater beef flavor intensity than fine and medium marbled steaks, indicating that coarse marbled beef should not be discriminated against, allowing for increased profits for packers and wholesalers.

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Angus Ground Beef Has Higher Overall Consumer Acceptability than Grass-Fed Ground Beef

Francisco Najar

Objective: Determine consumer palatability ratings of grass-fed ground beef in comparison to Angus and commodity ground beef.

Study Description: Fresh grass-fed ground beef, Angus ground beef, and commodity 80/20 ground beef from 14 distinct production lots were used to manually form 4 oz patties using a stainless steel and acrylic template. Patties were cooked using a clam shell grill to obtain an internal temperature of 165°F after a post-cook temperature rise. A total of 98 consumers evaluated the cooked patties for tenderness, juiciness, flavor liking, texture liking, and overall liking using 100 point line scales and each palatability trait was rated as either acceptable or unacceptable.

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Percentage of commodity, grass-fed, and Angus ground beef samples considered acceptable for palatability traits by consumers (n = 98).

Treatment	Tenderness acceptability	Juiciness acceptability	Flavor acceptability	Texture acceptability	Overall acceptability
Angus	91.6	92.4	83.3[ab]	90.0	94.9[a]
Commodity	84.7	91.4	90.6[a]	83.8	91.8[ab]
Grass-fed	84.7	87.4	73.9[b]	83.8	82.5[b]
SEM[1]	4.1	3.8	4.4	4.8	4.1
P-value	0.26	0.46	0.02	0.28	0.03

[ab]Least squares means in the same column lacking a common superscript differ (P<0.05).
[1]Standard error (largest) of the least squares means.

The Bottom Line: Angus and commodity ground beef were liked overall more than grass-fed ground beef, and Angus ground beef was more acceptable overall to consumers than grass-fed ground beef. Additionally, consumer's acceptability for ground beef flavor was higher for commodity ground beef than grass-fed ground beef. Ground beef palatability and acceptability is influenced by the source of diet of the beef.

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Bulls Are More Efficient Than Steers with Similar Meat Quality

Maggie Youngers

Objective: To evaluate the effects of castration and the use of growth promotion technologies in post-pubertal bulls on feeding performance, carcass traits, and meat quality characteristics compared to intact post-pubertal bulls.

Study Description: Twenty-four purebred bulls were used in a randomized complete block design to evaluate the effects of castration of post-pubertal bulls on feeding performance, carcass traits, and meat quality characteristics. Treatments included: intact (n = 12) or castrated with addition of growth-promoting technologies (n =12). There were 4 pens per treatment and cattle were fed a dry-rolled corn based finishing diet for 62 days. Cattle assigned to the castrated treatment were castrated using a Calicrate bander (St. Francis, KS) and implanted with 120 mg of trenbolone acetate and 24 mg of estradiol implant. The last 28 days of feeding, the castrated cattle were fed 1 lb/d of a pellet containing 300 mg/lb ractopamine hydrochloride beta-adrenergic agonist to provide 300 mg/hd/d of ractopamine hydrochloride. Cattle in the intact treatment were not implanted and were fed a similar amount of a placebo pellet the last 28 days on feed.

Least squares means illustrating the effects of castration on performance, carcass characteristics, and meat quality in 16 month old post-pubertal bovine males.

	Treatment[2]			
Item[1]	Intact	Castrated	Probability>F	SEM[3]
Initial weight, lb	1324	1340	0.65	3.5
Final weight, lb	1551	1516	0.30	55.7
Average daily gain, lb	4.07	3.19	0.02	0.46
Dry matter intake, lb	34.76	34.98	0.90	2.29
Gain:feed	0.12	0.09	0.02	0.012
Hot carcass weight, lb	981	955	0.36	19.3
Dressing percentage	63.74	63.73	0.99	0.70
Longissimus muscle area, in.[2]	16.6	15.0	< 0.01	0.57
12th rib fat depth, in.	0.41	0.40	0.85	0.04
Yield grade[4]	2.73	3.08	0.15	
Quality grade[5]	Low Choice	Low Choice	0.34	
Marbling score[6]	502	502	0.98	
Juiciness[7]	5.22	5.03	0.13	0.29
Overall tenderness[8]	5.26	5.53	0.10	0.07
Warner-Bratzler shear force, lb/0.5 in.[2]	10.56	9.46	0.46	0.10

For footnotes, see the full article online at http://newprairiepress.org/kaesrr

The Bottom Line: Carcass traits, growth parameters, and meat quality characteristics were not improved by castrating post-pubertal bulls.

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Cattlemen's Day 2017

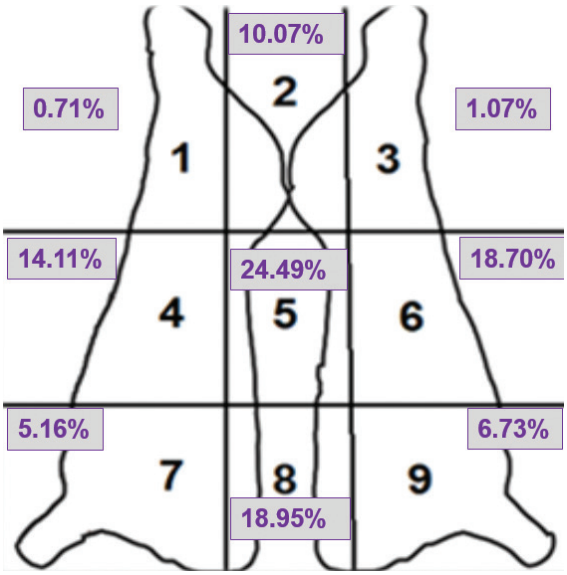
Beef Cattle Research

Relationship Between Trauma Sustained at Unloading and Carcass Bruise Prevalence in Finished Cattle at Commercial Slaughter Facilities

Tiffany Lee

Objective: An observational study was performed to determine whether a relationship exists between trauma experienced at unloading and carcass bruising in finished beef cattle at commercial slaughter facilities.

Study Description: A total of 9,860 finished cattle were observed at unloading at commercial slaughter facilities. Traumatic events were recorded as cattle exited trailers onto the unloading docks at each facility and were categorized by location in which they occurred (back, shoulder, rib, or hip). Carcass bruising was observed on the same animals after the hide had been removed using the Harvest Audit Bruise Scoring System, which divided the carcass into a grid of 9 sections. Bruise size was recorded as Small (<2 in. in diameter), Medium (2-6 in. in diameter), or Large (>6 in. in diameter). Bruise color was used as an exclusion factor. Yellow bruises were presumed to be over 24 hours old, therefore were recorded, but not included in the statistical analysis. These measures were used to explore the relationship between trauma sustained at unloading and carcass bruising observed on the harvest floor.



Left: Example of carcass bruising observed along the dorsal midline of finished cattle carcass. Right: Nine-section grid used in the Harvest Audit Bruise Scoring System to determine location of carcass bruising.

The Bottom Line: More than half of the carcasses observed in this study had at least one bruise present, and a number of carcasses had multiple bruises. More than half of the bruising observed was along the dorsal midline, or topline, of the animals (Regions 2, 5, and 8; 53.5%), where the most expensive cuts of meat are located.

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Liver Abscess Severity at Slaughter Does Not Affect Meat Tenderness and Sensory Attributes in Commercially Finished Beef Cattle Fed Without Tylosin Phosphate

Elsie J. McCoy

Objective: To determine if the presence of liver abscesses in finished cattle at the time of slaughter has an effect on beef tenderness, palatability and other quality characteristics in U.S. Department of Agriculture Select and Low Choice quality grades.

Study Description: Steaks were collected from finished cattle not fed tylosin phosphate in a 3 × 2 factorial treatment arrangement in a completely randomized design to evaluate the interactive effects of liver abscess score (None, Mild, Severe) and USDA quality grade (Select, Low Choice) on meat tenderness and sensory attributes. A trained sensory analysis panel was conducted to analyze sensory attributes, and Warner-Bratzler shear force and slice shear force measurements were taken to measure objective tenderness.

Least squares means of effect of liver abscess score on Warner-Bratzler shear force, slice shear force, and cook loss for USDA Low Choice and Select beef strip loin steaks.

Treatment	Warner Bratzler shear force, lb	Slice shear force, lb	Cook loss, %
Quality Grade			
Select	9.99	62.77	15.96
Low Choice	9.30	59.37	16.03
SEM[1]	0.29	2.84	0.29
P-value	0.09	0.39	0.87
Liver abscess score[2]			
None	9.77	63.98	16.42
Mild	9.57	58.84	15.57
Severe	9.59	60.43	16.00
SEM[1]	0.37	3.57	0.37
P-value	0.91	0.52	0.21
Quality grade × liver abscess			
P-value	0.38	0.61	0.15

[ab] Means with different superscripts differ at the P≤0.05 significance level.
[1]Standard error of the least squares mean.
[2]None-healthy liver, no abscess; Mild-1 abscess less than 0.77 in diameter to 4 abscesses less than 1.57 in diameter; and Severe-1 abscess greater than 1.57 in diameter or greater than 4 small abscesses.

The Bottom Line: Liver abscesses at the time of slaughter do not have an effect on beef instrumental tenderness or sensory attributes regardless of liver abscess severity in feedlot cattle finished without tylosin phosphate.

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Cattlemen's Day 2017

Beef Cattle Research

Summary Publication

This summary publication is intended for distribution at Cattlemen's Day 2017. Full reports are available at ***http://newprairiepress.org/kaesrr***

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