KANSAS STATE UNIVERSITY
CATTLEMEN'S DAY

CATTLEMEN'S DAY 2026

BEEF CATTLE RESEARCH

SUMMARY PUBLICATION

K-STATE Research and Extension

KANSAS STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION AND COOPERATIVE EXTENSION SERVICE

CATTLEMEN'S DAY 2026

BEEF CATTLE RESEARCH

Contents

Beef Cattle Management

1 Assessment of Protein and Fiber Content of Kansas Grasslands Enrolled in the Conservation Reserve Program

2 The Effect of Arrival Vaccine Combination on Performance and Efficiency During the Receiving and Backgrounding Phase

3 Evaluation of Synovex One Grower Implantation on Pre-weaning Performance of Suckling Beef Steers

4 Effects of 28-day Rotation of Monensin and Laidlomycin Propionate on Commercial Cattle Performance During the Growing Phase

5 Use of Unmanned Aerial Vehicle Technologies with Thermal Imaging to Assess Surface Moisture in Pens of Cattle Offered Energy-dense vs. Low-energy Feeding Programs

6 Effects of Alternative Feed Timing on Growth Performance and Water Usage in Growing Beef × Dairy Heifers Fed a High Roughage Diet

7 Effects of Alternative Feed Timing on Growth Performance and Water Usage in Limit Fed Growing Beef × Dairy Heifers

8 Interactive Effects of Body Weight and Body Condition Score on Enteric Methane Emissions in Grazing Beef Cows

9 Field Validation of a Mob Composite Sampling Protocol to Estimate Herd Parasitism in Cattle

Beef Cattle Reproduction

10 Genetic Parameter Estimation for Breeding Soundness Examination Traits in Angus Bulls

11 A Preliminary Study: The Effects of Vaginal Flushing in Cattle on Mitigating Vaginitis Induced by a Controlled Internal Drug Release (CIDR)

12 Evaluating the Relationship Between Anogenital Distance, Reproductive Tract Score, and Fertility to Timed-artificial Insemination in Commercial *Bos taurus* Beef Heifers

13 Effects of an Alleyway Brush on the Behavior of Commercial Beef Heifers and Cows During a 7-day CO-Synch + CIDR Protocol and Pregnancy Outcomes

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BEEF CATTLE RESEARCH

Beef Cattle Nutrition

14 Effects of Incorporation of Ruminally Protected Methionine into a Commercial Mineral Supplement on Growth Performance of Grazing Beef Steers in the Kansas Flint Hills

15 Effects of Short Duration Omega-3 Based Fatty Acid Supplementation to Developing Heifers on Growth, Intake, and Reproduction

16 The Effects of Feeding Strategies on Performance and Liver Abscess Prevalence on Growing Beef × Dairy Steers

17 Effects of Dietary Inclusion of an Omega-3 Fatty Acid-based Supplement on Biological Parameters and Sperm Characteristics of Developing Beef Bulls

18 Effect of Pyramid Enzyme on the Performance of Finishing Cattle Fed Sorghum-based Diets

Meat Science

19 Determining the Effect of Electromagnetic Field-assisted Freezing on Shelf-stability of Beef Striploins

20 The Effects of Aging Period and Freezing Sequence on Desmin Degradation of *Longissimus lumborum, Semitendinosus,* and *Biceps femoris* Steaks

21 The Cold Chain Question: Effects of Fresh, Frozen, and Thawed Beef Trim on Ground Beef Color and Consumer Perception

22 What's the Beef with Consumer Appeal?

23 Hey Good Looking, How Have You Been Cooking? The Role of Cooking Method on Cooked Color and Palatability of Beef Steaks

24 Consumer Preferences for Eating Quality of USDA Prime Beef Differentiated into Tiers

25 Trained Panel Evaluation of Upper 2/3 Prime Beef Strip Loins

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BEEF CATTLE RESEARCH

Assessment of Protein and Fiber Content of Kansas Grasslands Enrolled in the Conservation Reserve Program

Jason Warner

Objective: To measure the nutrient content of standing Conservation Reserve Program (CRP) forages in Kansas throughout the year.

Study Description: Standing forage samples (n = 294) were collected from 25 sites across 16 counties over two years in Kansas by Extension agents and Beef Cattle specialists. Samples were classified as eastern or northwestern Kansas based on the site location and were collected monthly to determine composition change throughout the year. All samples were analyzed for crude protein, total digestible nutrients, calcium, and phosphorus.

Results: Within the primary growing season months, samples analyzed were not different ($P \geq 0.05$) in crude protein content but peaked earlier for samples collected from eastern Kansas. During May, total digestible nutrient concentrations were higher ($P \leq 0.05$) for eastern (51.1%) relative to northwestern (39.6%) Kansas.

The Bottom Line: The nutrient composition data for CRP forages can be used by producers to make informed management decisions when CRP is released for haying or grazing, which is critical, as previous assessments of CRP forage quality throughout Kansas are not widely available.

For more information, contact:
Jason Warner
Extension Cow-Calf Specialist
785-532-1460
jasonwarner@k-state.edu

Sandy Johnson
Extension Beef Specialist
785-462-6281
sandyj@ksu.edu

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The Effect of Arrival Vaccine Combination on Performance and Efficiency During the Receiving and Backgrounding Phase

Macie Weigand

For more information, contact:
A.J. Tarpoff
Beef Veterinarian
Extension Specialist
785-532-1255
tarpoff@ksu.edu

Objective: Given the array of options for vaccination protocol combinations, the objective of this study was to evaluate a direct comparison of various product lines on their effects on feed intake early in the feeding period.

Study Description: A total of 393 heifers were used in a 56-day backgrounding trial to assess the effects of three different arrival vaccine combinations on growth performance, feed efficiency, health, and water use during the receiving and backgrounding period. Treatments were: Pyramid (Pyramid 5 + Presponse SQ [Boehringer Ingelheim, Ridgefield, CT] and Bovilis Vision 7 Somnus with Spur [Merck Animal Health, Rahway, NJ]); Stimulator (Stimulator 5 [Bimeda, Schaumburg, IL], Pro-Bac 4 [Bimeda, Schaumburg, IL], and Bovilis Vision 7 with Spur [Merck Animal Health, Rahway, NJ]); and Bovi-Shield Gold (Bovi-Shield Gold One Shot [Zoetis Inc., Parsippany, NJ] and Bovilis Vision 7 Somnus with Spur).

Results: Following the 56-day backgrounding period, the final body weight and average daily gains of heifers did not differ ($P \geq 0.35$) between treatments. Dry matter intake and feed efficiency showed no difference ($P \geq 0.53$) among treatments. Additionally, water usage did not differ ($P = 0.51$) among treatments.

The Bottom Line: These data suggest that the combination of vaccine treatments used upon arrival in this study had no negative effects on the growth performance, feed efficiency, or health outcome of heifers. It is important to consider the health status of the cattle being vaccinated as well as the number of injections given during a processing event.

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Evaluation of Synovex One Grower Implantation on Pre-weaning Performance of Suckling Beef Steers

Jonathan Jacquez

Objective: To evaluate the administration of Synovex One Grower (Zoetis, Parsippany, NJ) implants to suckling beef steer calves at approximately 50 days of age on pre-weaning growth performance.

Study Description: Over three years, 306 spring-born suckling steer calves were randomly assigned to one of two treatments: 1) non-implanted control (CON); or 2) implanted with Synovex One Grower (IMP). Implants were administered at 49 ± 18 days of age and 194.0 ± 50.7 lb of body weight. Calves grazed on native mixed grass pastures with their dams until weaning at approximately 135 days of age. Calf average daily gain and total weight gain were determined.

For more information, contact:
Jason Warner
Extension Cow-Calf Specialist
785-532-1460
jasonwarner@ksu.edu

Emma Briggs
Beef Systems Extension Specialist
785-625-3425
eabriggs@ksu.edu

Effect of Synovex One Grower implantation on suckling calf performance

	Treatment			
Item	**CON[1]**	**IMP[2]**	**SEM[3]**	***P*-value**
Cow age[4], year	5.20	5.19	1.06	0.95
Initial calf age, day	46	47	11	0.46
Initial calf body weight (BW), lb	192	191	32	0.62
Ending calf BW, lb	383	400	25	≤ 0.01
Total calf BW gain, lb	191	211	17	≤ 0.01
Calf average daily gain, lb	2.38	2.62	0.10	≤ 0.01

[1]CON = non-implanted control.
[2]IMP = implanted with Synovex One Grower.
[3]SEM = standard error of the mean.
[4]Average cow age at trial initiation across all years.

The Bottom Line: Administering Synovex One Grower implants to suckling beef steer calves at approximately 50 days of age improves pre-weaning performance during the early phase of hormone release.

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BEEF CATTLE RESEARCH

Effects of 28-day Rotation of Monensin and Laidlomycin Propionate on Commercial Cattle Performance During the Growing Phase

Madison Bemisderfer

Objective: Investigate the effects of multiple 28-day rotations of monensin (Rumensin 90; Elanco, Indianapolis, IN) and laidlomycin propionate (Cattlyst 50G; Phibro Animal Health Corporation, Teaneck, NJ) on growing commercial heifer performance.

Study Description: A total of 584 heifers (639 ± 57 lb initial body weight [BW]) were randomly divided among 10 pens at a commercial feedyard. All heifers were limit-fed a growing ration with treatment assigned as: 1) monensin (MON) included at 18.8 g/ton on a dry matter (DM) basis; or 2) 28-day rotation (ROT) of monensin (included at 18.8 g/ton on a DM basis) to laidlomycin propionate (included at 7.4 g/ton on a DM basis) repeated twice during the 112-day trial. Performance was assessed with BW measurements every 28 days.

Cumulative cattle performance across multiple 28-day periods of study of monensin (MON) versus rotational ionophore treatment (ROT) heifers

Days on feed	Item[1]	MON	ROT	SEM[2]	*P*-value
1-28[a]	ADG, lb/day	3.53	3.63	0.26	0.71
	DMI, lb/day	18.50	18.70	0.70	0.84
	Feed:gain	5.26	5.10	0.24	0.61
1-56[b]	ADG, lb/day	3.44	3.76	0.17	0.16
	DMI, lb/day	20.40	20.60	0.68	0.64
	Feed:gain	5.88	5.32	0.22	0.06
1-84[c]	ADG, lb/day	3.27	3.39	0.09	0.20
	DMI, lb/day	21.80	21.90	0.68	0.95
	Feed:gain	6.54	6.21	0.12	0.06
1-112[d]	ADG, lb/day	3.12	3.39	0.09	<0.01
	DMI, lb/day	23.00	23.10	0.72	0.78
	Feed:gain	7.14	6.58	0.14	<0.01

[1] ADG = average daily gain, DMI = dry matter intake.
[2] Standard error of the mean.
[a] From day 1-28, MON and ROT both received monensin for 28 days.
[b] From day 1-56, MON received monensin for 56 days; ROT received monensin for 28 days followed by laidlomycin propionate for 28 days.
[c] From day 1-84, MON received monensin for 84 days; ROT received 56 total days of monensin with an interim 28 days laidlomycin propionate.
[d] From day 1-112, MON received monensin for 112 days; received monensin for a total of 56 days and laidlomycin propionate for a total of 56 days alternating ionophore inclusion every 28 days.

The Bottom Line: Rotating monensin and laidlomycin propionate every 28 days during the growing phase improved the performance of limit-fed beef heifers by 8.7% compared to consistent monensin feeding, indicating a label-compliant strategy with possible performance value.

For more information, contact:
Haley Larson
Animal Nutrition and Health
913-307-7326
haleyls@ksu.edu

Logan Thompson
Sustainable Livestock Feeding
Extension Specialist
785-532-2840
thom94@ksu.edu

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BEEF CATTLE RESEARCH

Use of Unmanned Aerial Vehicle Technologies with Thermal Imaging to Assess Surface Moisture in Pens of Cattle Offered Energy-dense vs. Low-energy Feeding Programs

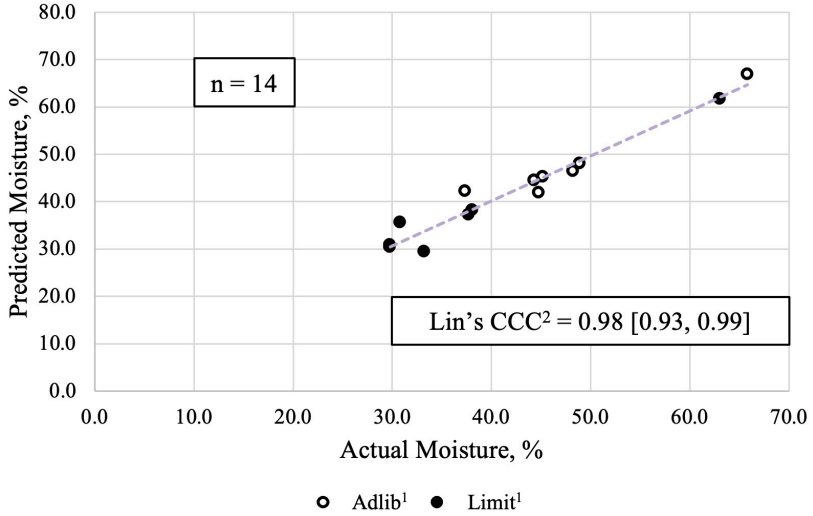
Logan Diller

Objective: Characterize surface moisture levels in cattle pens as determined by different feeding programs and evaluate associations between unmanned aerial vehicle (UAV) thermal images and surface moisture in pens.

Study Description: Six dirt-floor pens (30 × 50 ft) housing 14 dairy-beef crossbred steers each were assigned to an energy-dense, limit-fed ration (LIMIT; 64 net energy for gain [NEg]) or a low-energy *ad libitum* ration (ADLIB; 50 NEg). Each pen was divided into 15 quadrants, and pen floor samples were collected for moisture analysis. A UAV was flown to capture thermal images, which were processed to extract quadrant-level luminosity values. Associations between UAV-derived luminosity and direct moisture measurements were analyzed.

Results: Feeding program significantly affected surface-moisture levels, with *ad libitum* pens having higher moisture levels than limit-fed pens ($P < 0.001$). Luminosity derived from UAV imagery was also a significant predictor of pen surface moisture, with brighter values corresponding to drier pen conditions ($P < 0.001$). Moisture was predicted with very high accuracy, as demonstrated by strong agreement between observed and model-predicted values (Lin's concordance correlation coefficient [CCC] = 0.98).

Relationship between observed and predicted mean moisture values for pen by day



[1]Treatment: ADLIB = low-energy *ad libitum* (50 Mcal/cwt net energy for gain [NEg]); LIMIT = energy-dense limit-fed (64 Mcal/cwt NEg).
[2]Lin's concordance correlation coefficient: > 0.9 excellent; 0.8 - 0.9 good; 0.6 to 0.8 moderate; below 0.6.

The Bottom Line: Results confirmed low-energy, *ad libitum* pens were wetter than energy-dense, limit-fed pens, and luminosity values strongly predicted moisture with excellent agreement (CCC = 0.98).

For more information, contact:
Haley Larson
Animal Nutrition and Health
913-307-7326
haleyls@ksu.edu

Logan Thompson
Sustainable Livestock Feeding
Extension Specialist
785-532-2840
thom94@ksu.edu

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BEEF CATTLE RESEARCH

Effects of Alternative Feed Timing on Growth Performance and Water Usage in Growing Beef × Dairy Heifers Fed a High Roughage Diet

Clayton Stoskopf

Objective: The objective of this study was to evaluate the effects of feed delivery time on growth performance and water usage of growing cattle on high-roughage diets fed *ad libitum* during periods of heat stress.

Study Description: A total of 260 black-hided, dairy-derived beef heifers were blocked by weight, stratified within block, and randomly assigned to 20, 13-head pens. Pens were randomly assigned to one of two treatments: 7:00 a.m. or 7:00 p.m. feed delivery of a diet formulated to provide 50 Mcal of net energy for gain per 100 lb of dry matter for *ad libitum* intake. Heifers were fed once daily, targeting 10% daily feed refusals for an 84-day period. Water usage was recorded using meters attached to each water unit.

Results: Final body weight and average daily gain did not differ ($P \geq 0.98$) between treatments following the 84-day feeding period. Lower water usage was observed in the 7:00 p.m. treatment ($P < 0.01$) compared to the 7:00 a.m. treatment.

Growth performance and water usage of growing beef × dairy heifers fed a high roughage diet for *ad libitum* intake

	Treatment[1]			
Item	AM	PM	SEM[2]	*P*-value
Initial body weight, lb	459	459	28.708	0.78
Final body weight, lb	664	663	13.930	0.98
Average daily gain, lb/day	2.44	2.44	0.368	0.99
Dry matter intake, lb/day	18.56	18.35	0.782	0.47
Gain:feed, lb/lb	0.15	0.15	0.002	0.51
Feed:gain, lb/lb	6.70	6.71	0.079	0.89
Water usage, gal/day[3]	10.88[b]	10.36[a]	1.404	< 0.01

[1] AM = fed at 7:00 a.m.; PM = fed at 7:00 p.m.
[2] Largest standard error of the means.
[3] Calculated by dividing total daily pen water usage by number of head in pen.
[ab] Within row, means with uncommon superscripts differ ($P \leq 0.05$).

The Bottom Line: Delivering feed at 7:00 p.m. did not improve growth performance compared to 7:00 a.m. feedings, but the later feeding time did decrease water usage in growing heifers during an 84-day feeding period.

For more information, contact:
Dale Blasi
Beef Cattle Nutrition and Management Extension Specialist
785-532-5427
dblasi@ksu.edu

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Effects of Alternative Feed Timing on Growth Performance and Water Usage in Limit Fed Growing Beef × Dairy Heifers

Clayton Stoskopf

Objective: The objective of this study was to evaluate the effects of feed delivery time on growth performance and water usage of growing limit-fed heifers during periods of heat stress.

Study Description: A total of 257 black-hided dairy-derived beef heifers were blocked by weight, stratified within block, and randomly assigned to 20 pens containing 12 to 13 head/pen. Pens were randomly assigned to one of two treatments: 7:00 a.m. or 7:00 p.m. feed delivery of a diet formulated to provide 60 Mcal of net energy for gain per 100 lb of dry matter (DM) for limited intake. Heifers were fed once daily at 2.0% of body weight (BW) on a DM basis for an 84-day period. Water usage was recorded using meters attached to each water unit.

Results: Final BW, average daily gain, DM intake, and feed:gain did not differ ($P \geq 0.62$) between 7:00 a.m. and 7:00 p.m. fed heifers. However, water usage was greater ($P < 0.01$) in 7:00 a.m. fed heifers compared to 7:00 p.m. fed heifers.

Growth performance and water usage of growing limit fed beef × dairy heifers

	Treatment[1]			
Item	**AM**	**PM**	**SEM[2]**	***P*-value**
Initial body weight, lb	470	470	9.163	0.99
Final body weight, lb	643	644	12.626	0.95
Average daily gain, lb/day	2.06	2.07	0.075	0.93
Dry matter intake, lb/day	12.08	12.28	0.281	0.63
Gain:feed, lb/lb	0.17	0.17	0.006	0.81
Feed:gain, lb/lb	5.89	6.07	0.248	0.62
Water usage, gal/day[3]	10.42[b]	9.54[a]	0.100	< 0.01

[1] AM = fed at 7:00 a.m.; PM = fed at 7:00 p.m.
[2] Largest standard error of the means.
[3] Calculated by dividing total daily pen water usage by number of head in pen.
[ab] Within row, means with uncommon superscript differ ($P \leq 0.05$).

The Bottom Line: Feed timing did not negatively affect growth performance but did reduce water usage when heifers were fed in the evening.

For more information, contact:
Dale Blasi
Beef Cattle Nutrition and Management Extension Specialist
785-532-5427
dblasi@ksu.edu

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Agricultural Experiment Station
and Cooperative Extension Service

BEEF CATTLE RESEARCH

Interactive Effects of Body Weight and Body Condition Score on Enteric Methane Emissions in Grazing Beef Cows

C.M. Salisbury

Objective: To evaluate how body weight and body condition score, both independently and interactively, influence enteric methane production and emission efficiency in beef cows during spring grazing.

Study Description: This retrospective analysis used data from a supplementation trial with mature, spring-calving beef cows grazing native pasture. Cows were weighed and scored monthly. Methane emissions were measured using GreenFeed systems (AHCS; C-Lock Inc., Rapid City, SD), and supplement intake was recorded with automated feeders. Cows were grouped by changes in body condition score over time.

Results: A linear model explained 43% of the variation in methane output. Emissions increased with body weight (0.79 g/day/lb; $P = 0.028$) and tended to increase with body condition score (173.3 g/day/unit; $P = 0.068$). An interaction ($P = 0.050$) showed that the emission effect of increasing body condition score diminished in heavier cows. When expressed relative to supplement intake, cows that maintained condition had the lowest emissions (185 g/lb of supplement dry matter intake), followed by cows that lost (198 g/lb) or gained (219 g/lb) condition. Similar trends were observed for emissions per unit body weight; although differences were not statistically significant ($P = 0.24$). These results suggest that moderate cow size and stable body condition are associated with improved emission efficiency.

Impact of body condition score changes over the spring grazing period on enteric methane emissions

	Body condition score change group[1]				
Item	**LOSS**	**MAIN**	**GAIN**	**SEM[2]**	***P*-value**
Methane g/day	191.0[a]	196.1[a]	276.9[b]	13.5	0.03
Methane g/day/lb of supplement dry matter intake	198.0	185.0	219.0	10.0	0.24

[ab]Values within a row with different superscripts differ ($P < 0.05$).
[1]LOSS = lost body condition score; MAIN = maintained body condition score; GAIN = gained body condition score.
[2]Standard error of the mean.

The Bottom Line: Cows with moderate weight and stable body condition emitted less methane per unit of supplement intake, supporting both environmental and production efficiency goals.

For more information, contact:
Logan Thompson
Sustainable Livestock Feeding
Extension Specialist
785-532-2840
thom94@ksu.edu

Jason Warner
Cow-Calf Extension Specialist
785-532-1460
jasonwarner@ksu.edu

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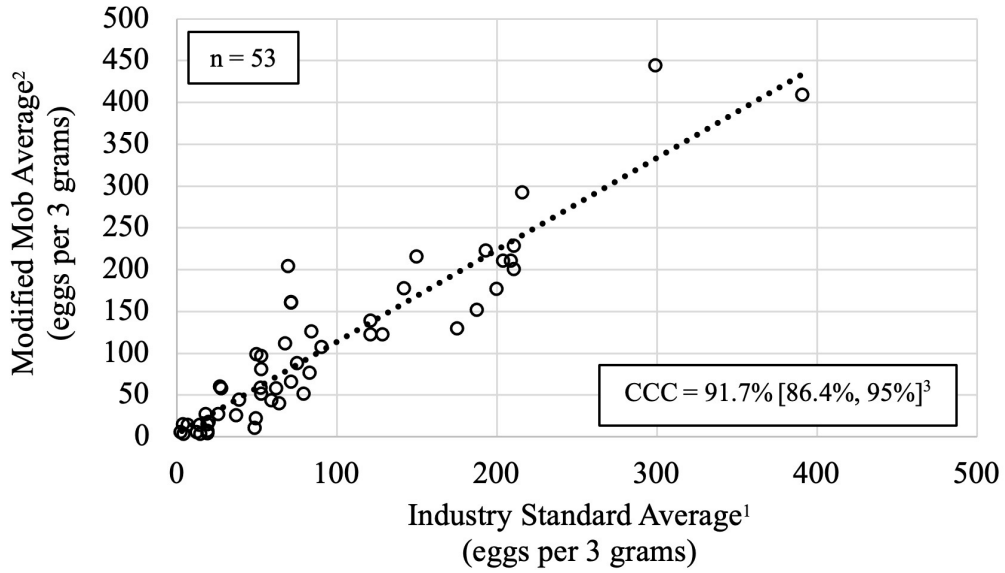
Field Validation of a Mob Composite Sampling Protocol to Estimate Herd Parasitism in Cattle

Ashlee Gibbons

Objective: Evaluate the efficacy of a mob composite sampling (MOB) approach against the existing industry standard fecal sampling protocol of individual samples (IDV) to determine herd fecal egg counts of nematodes in beef cattle.

Study Description: Samples (n = 1,060) from fresh pen floor fecal pats were collected at random from cattle (calf-fed and yearling) in commercial feedlots (n = 12) and sale barns (n = 1). Sample sets of 20 fecal pat samples were collected by pen (n = 53), ranging from 64 to 225 animals. The MOB samples (n = 106) were further processed to yield two composite samples, each representing 10 of the original pen samples. The IDV and MOB samples were analyzed by microscope for nematode eggs/3 g.

Correlation between Industry Standard Average and Modified Mob Average



[1]Industry standard (IDV) = average of 20 fecal pat samples collected per pen.
[2]Modified mob (MOB) = average of two composite samples each comprised of 10 of the original pen samples.
[3]Lin's concordance correlation coefficient (CCC) analysis for agreement between IDV and MOB methods with a 95% confidence interval.

The Bottom Line: Results indicate a mob sampling approach using two composite samples each representing 10 fecal pats, can determine parasite loads with 91.7% confidence in received cattle relative to industry standard field fecal sampling techniques.

For more information, contact:
Haley Larson
Animal Nutrition and Health
913-307-7326
haleyls@ksu.edu

AJ Tarpoff
Beef Veterinarian
Extension Specialist
785-532-1255
tarpoff@ksu.edu

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Genetic Parameter Estimation for Breeding Soundness Examination Traits in Angus Bulls

Danielle Ellinghuysen

Objective: The objectives of this study were to estimate heritabilities, repeatabilities, and genetic relationships between scrotal circumference and semen quality traits to better understand their potential application in bull fertility genetic evaluation.

Study Description: Eleven purebred Angus breeders provided 5,877 breeding soundness examination records on 4,996 bulls. The data included measurements of scrotal circumference, percentage of motility, gross motility score, percentage of primary abnormalities, percentage of secondary abnormalities, percentage of normal spermatozoa, and percentage of abnormal spermatozoa. Genetic parameters were estimated with statistical software also used by the American Angus Association for genetic evaluations.

Results: Heritability describes the portion of trait variation explained by genetics, indicating the strength of the relationship between breeding values and observed traits. Scrotal circumference was moderately heritable, while semen quality traits such as motility and morphology were lowly heritable. Repeatability, or the consistency of repeated measurements, was moderate for most semen quality traits, but high for scrotal circumference and the percentage of primary abnormalities. Genetic correlations measure how strongly the breeding values of two traits are related. A favorable relationship was found between scrotal circumference and normal spermatozoa, suggesting that selecting for larger scrotal circumference could increase the proportion of normal sperm. A favorable phenotypic relationship was also observed between normal spermatozoa and motility, meaning sperm that moved better tended to have more normal morphology. However, an unfavorable genetic relationship appeared between scrotal circumference and motility. This was unexpected, because normally developed sperm should also move better. These findings suggest that further research is needed to determine whether an optimal scrotal circumference range exists to maximize semen quality.

The Bottom Line: These results indicate that it is feasible to improve bull fertility with genetic selection, but further research is needed to determine the best methods for developing a commercially available genetic evaluation for bull reproduction.

For more information, contact:
Megan Rolf
Animal Breeding and Genetics
785-532-1450
megrolf@ksu.edu

Emma Briggs
Beef Systems Extension Specialist
785-625-3425
eabriggs@ksu.edu

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BEEF CATTLE RESEARCH

A Preliminary Study: The Effects of Vaginal Flushing in Cattle on Mitigating Vaginitis Induced by a Controlled Internal Drug Release (CIDR)

Sydney Noel

Objective: The objective was to characterize CIDR-induced vaginitis in beef heifers by quantifying inflammatory cells and evaluating if flushing the vagina with a saline solution after CIDR removal reduces polymorphonuclear leukocyte (PMN) cells on day 10 compared to unflushed heifers.

Study Description: Beef heifers (n = 19) from the Kansas State University Heifer Development Unit were stratified by weight and randomly assigned to CIDR+Flush (n = 7), CIDR (n = 7), or control (n = 5). Vaginitis scores were given visually. Vaginal cytology samples were collected with sterile swabs and analyzed on days 0, 7, and 10. On day 7, the CIDRs were removed, vaginitis scores assessed, and a sterile saline solution was used in the CIDR+Flush group to lavage the vagina at CIDR removal in conjunction with using a Metricheck device to remove the flush from the vagina.

Average vaginitis score, CIDR score, and percentage of polymorphonuclear cells (PMN)

	Average vaginitis score[1]			Average CIDR score[2]			Average PMN cells (%)		
Group	**Control**	**CIDR**	**Flush**	**Control**	**CIDR**	**Flush**	**Control**	**CIDR**	**Flush**
Day 0	1	1.3	1.1				7.0	6.2	5.2
Day 7	1				3.1	3.3	24.2	20.4	23.6
Day 10	1	1.4	1.6				27.6	29.7	28.5
P-value							TRT[3] = 0.9183 Day < 0.0001 TRT × Day = 0.7476		

[1]There were no differences between groups for vaginitis scores.
[2]There were no differences between groups for CIDR scores.
[3]TRT = Treatment.

The Bottom Line: CIDR-induced vaginal inflammation is an issue in yearling heifers. Using strategies to indicate when PMN levels are greatest could optimize interventions and improve reproductive outcomes.

For more information, contact:
Nicholas Wege Dias
Beef Cattle Reproduction
785-532-1222
diasnw@ksu.edu

Sandy Johnson
Physiology/Beef Extension Specialist
785-462-6281
sandyj@ksu.edu

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Evaluating the Relationship Between Anogenital Distance, Reproductive Tract Score, and Fertility to Timed-artificial Insemination in Commercial *Bos taurus* Beef Heifers

Allen Schwartz

Objective: This study was to evaluate the relationship between anogenital distance (AGD) and reproductive tract score (RTS) to fertility in commercial beef heifers enrolled in a timed-artificial insemination (TAI) protocol.

Study Description: Replacement heifers (n = 888) from eight locations in Kansas and Tennessee were enrolled in TAI synchronization protocols. Heifers were assigned an RTS and measured for their AGD. Heifers were tested by transrectal ultrasound to determine pregnancy to the TAI, and an analysis of pregnancy based on RTS and AGD was done.

Results: There was a difference ($P < 0.05$) for RTS between open heifers (3.72) compared to pregnant heifers (3.87). Trained technicians' ability to accurately score the reproductive tract prior to the breeding season allows for the culling of immature heifers before the breeding season. The average AGD of open heifers was 84.07 mm, while pregnant heifers were 83.09 mm, which was not significant ($P > 0.05$). Open heifers had an average weight of 806 lb while the pregnant heifers had an average weight of 813 lb. Although there was a numeric difference of 7 lb, there was no statistical difference ($P > 0.05$). A combined model of RTS and AGD was used to determine the probability of pregnancy when both variables were considered. Heifers that had an AGD over the average (84 mm) had a decreased probability of 1.2% of being pregnant for each mm over the average. The RTS was associated with pregnancy odds. Compared to RTS 1, the odds of pregnancy were generally higher for heifers with greater RTS, with differences ($P < 0.05$) observed between RTS 2 and 5, and RTS 3 and 5. Heifers with a shorter AGD and higher RTS have a greater probability of becoming pregnant to the first round of TAI. Our results indicate that average RTS is more related to TAI pregnancy rates than the average AGD. However, when ranking females according to AGD within locations, the use of RTS and AGD ranking had a stronger prediction of pregnancy to TAI. We conclude that RTS is a better tool for identifying fertile heifers than AGD. However, AGD might be used as a second layer of selection to increase accuracy.

The Bottom Line: The RTS was a better predictor of pregnancy in virgin beef heifers than AGD. However, when both assessments were combined, there was greater prediction power for pregnancy to TAI.

For more information, contact:
Nicholas Dias
Beef Cattle Reproduction
785-532-1222
diasnw@ksu.edu

Sandy Johnson
Physiology/Beef Extension Specialist
785-462-6281
sandyj@ksu.edu

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Effects of an Alleyway Brush on the Behavior of Commercial Beef Heifers and Cows During a 7-day CO-Synch + CIDR Protocol and Pregnancy Outcomes

Danielle Ellinghuysen

Objective: The objective of this study was to explore the effects of using a cattle brush device as positive reinforcement during the handling events of the estrus synchronization (ES) protocol on temperament and pregnancy rates of beef cows and heifers.

Study Description: A total of 71 heifers and 162 cows at the Agricultural Research Center, Hays, KS, were stratified by reproductive/physiological status and randomly assigned to treatment (TRT) or control (CTRL). During the ES protocol, TRT animals encountered a spring-mounted brush before entering the chute, while CTRL animals did not. Chute score (CS) and exit velocity (EV) were recorded on each day. Estrotect indicators were applied and measured. Pregnancy was diagnosed by ultrasound 33 days post-timed artificial insemination (TAI) for heifers and 68 days for cows.

Results: No treatment differences in CS were observed on days –10, 0, or 7 ($P > 0.10$). However, on the day of TAI, TRT heifers had lower CS ($P < 0.01$) and box scores ($P < 0.01$) than CTRL heifers, while TRT cows tended to have lower CS values ($P < 0.10$). Exit velocity did not differ between groups, but both cows and heifers showed a day effect ($P < 0.01$). Estrotect scores were unaffected by treatment ($P > 0.10$). Pregnancy rates were similar between TRT and CTRL groups for heifers and cows ($P > 0.10$). However, estrus expression positively influenced pregnancy outcomes in heifers ($P < 0.01$) and cows ($P < 0.05$). Days postpartum also tended to affect cow pregnancy rates ($P < 0.10$).

The Bottom Line: Bovine temperament can be improved through sequential handling events, but additional research is needed to determine the effects of positive reinforcement with a brush in the chute alley on reproductive production measures.

For more information, contact:
Nicholas Dias
Reproductive Physiology
785-532-1222
diasnw@ksu.edu

Sandy Johnson
Physiology/Beef Extension Specialist
785-462-6281
sandyj@ksu.edu

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and Cooperative Extension Service

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BEEF CATTLE RESEARCH

Effects of Incorporation of Ruminally Protected Methionine into a Commercial Mineral Supplement on Growth Performance of Grazing Beef Steers in the Kansas Flint Hills

Rachel Donaldson

For more information, contact:
Dale Blasi
Beef Cattle Nutrition and Management Extension Specialist
785-532-5427
dblasi@ksu.edu

Objective: Our objective was to evaluate the effects of incorporating a ruminally protected methionine hydroxy analog into a mineral supplement on growth performance and mineral intake of grazing beef steers in the Kansas Flint Hills.

Study Description: Crossbred beef steers (n = 360) were randomly assigned to one of 18 pastures. Pastures were randomly assigned to one of two mineral treatments: a commercial mineral supplement with no added methionine (NoMet) or a commercial mineral supplement with a methionine hydroxy analog (Met [MetaSmart, Adisseo, Alpharetta, GA]). Steers were grazed for 90 days at a targeted stocking rate of 250 lb of live weight/acre. Mineral was provided for *ad libitum* intake and body weights were measured on day 0 and day 90.

Growth performance and mineral intake of grazing crossbred steers

	Treatments[1]			
Item	NoMet	Met	SEM[2]	*P*-value
Number of head	180	180		
Number of pastures	9	9		
Initial body weight, lb	612	611	2.387	0.75
Final body weight, lb	837	840	5.805	0.74
Average daily gain, lb/day	2.51	2.55	0.069	0.67
Mineral intake, oz/head/day	7.56[a]	5.56[b]	0.463	< 0.01

[ab] Within row, means with different superscripts differ ($P < 0.05$).
[1] NoMet = no added methionine to commercial, free choice mineral; Met = hydroxyl methionine analog (Adisseo, Alpharetta, GA) added to commercial, free choice mineral.
[2] Largest standard error of the mean.

The Bottom Line: Incorporating a methionine hydroxy analog into a commercial mineral supplement did not improve growth performance but did reduce mineral consumption by crossbred beef steers grazing the Kansas Flint Hills.

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Effects of Short Duration Omega-3 Based Fatty Acid Supplementation to Developing Heifers on Growth, Intake, and Reproduction

Megan Sollors

Objective: The objective of this study was to assess the effect of omega-3 fatty acid supplementation on body weight gain, feed intake, and reproductive efficiency in replacement heifers.

Study Description: This two-year study (2024: 56 days, 2025: 68 days) at Kansas State University evaluated omega-3 supplementation on spring-born heifers. Heifers were assigned based on body weight and age to one of two treatments: non-supplemented control (NOSUPP, n = 39) or supplemented (SUPP, n = 46) with 0.48 - 0.72 lb/day dry matter basis of an extruded flaxseed and algae-based supplement designed to provide omega-3 fatty acids (Better Fed Foods/NBO3, Manhattan, KS). In 2024, NOSUPP had one diet, while in 2025, more than one base diet was fed due to ingredient availability and logistical constraints. Estrus was synchronized (Select Synch + controlled internal dry release + artificial insemination), and then heifers were exposed to Angus sires for ≥ 45 days. Body weight, intake, and pregnancy status were measured and analyzed in SAS.

Performance and reproduction of heifers by supplementation treatment

	Treatment			
Item	NOSUPP[1]	SUPP[2]	SEM[3]	*P*-value
Initial age, days	415	414	-	-
Initial body weight, lb	873	853	24.3	0.44
Ending body weight, lb	988	997	27.6	0.76
Total body weight gain, lb	121	146	9.8	0.01
Average daily gain, lb	1.92	2.31	0.15	0.01
Dry matter intake, lb per day	19.2	20.1	0.78	0.25
Gain:feed, lb	0.105	0.114	0.008	0.24
Artificial insemination Pregnancy, %[4]	60.0	59.0	0.11	0.94
Total Pregnancy, %[5]	85.7	88.6	0.08	0.70

[1]NOSUPP = heifers not supplemented with an omega-3 based fatty acid supplement.
[2]SUPP= heifers supplemented with an omega-3 based fatty acid supplement.
[3]SEM = standard error of the mean.
[4]Heifers conceiving to AI on first service divided by the total within each treatment.
[5]Heifers conceiving to either AI or natural service divided by the total within each treatment.

The Bottom Line: Omega-3 supplementation improved heifer growth, which increased total body weight gain and average daily gain. Reproduction was not statistically different, though pregnancy rates rose slightly, suggesting a possible added benefit.

For more information, contact:
Jason Warner
Cow-Calf Extension Specialist
785-532-1460
jasonwarner@ksu.edu

Sandy Johnson
Physiology/Beef Extension Specialist
785-462-6281
sandyj@ksu.edu

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BEEF CATTLE RESEARCH

The Effects of Feeding Strategies on Performance and Liver Abscess Prevalence on Growing Beef × Dairy Steers

W. Cole Ellis

Objective: The objectives of this study were to evaluate the effects of diet, intake and use of tylosin phosphate on growth performance and liver abscess prevalence on growing beef × dairy steers.

Study Description: A total of 529 beef × dairy crossbred steers were used in a 126-day backgrounding study. Pens were randomly assigned to one of five treatments: a 50 net energy for gain (NEg) diet targeting 2 lb of gain/day (50-2 lb), 60 NEg diet targeting 2 or 3 lb of gain/day (60-2 lb and 60-3 lb, respectively), or a 64 NEg diet fed for *ad libitum* intake with or without tylosin phosphate (64-ALT and 64-ALNT, respectively; Tylovet 100, Huvepharma, Peachtree City, GA). Steers had an ultrasound on days 0 and 126 to determine liver abscess prevalence.

For more information, contact:
Dale Blasi
Beef Cattle Nutrition and Management Extension Specialist
785-532-5427
dblasi@ksu.edu

Effects of growing strategy on growth performance and liver abscess prevalence of growing beef × dairy steers

	Treatment[1]						
Item	**50-2 lb**	**60-2 lb**	**60-3 lb**	**64-ALNT**	**64-ALT**	**SEM[2]**	***P*-value[3]**
Number of pens	8	8	8	8	8		
Number of steers	106	105	106	107	105		
Body weight, lb							
Day 0	650	651	651	650	651	16.9	1.00
Day 126	990[a]	976[a]	1,067[b]	1,129[c]	1,121[c]	17.7	< 0.01
Average daily gain, lb/day	2.70[a]	2.58[a]	3.30[b]	3.80[c]	3.74[c]	0.052	< 0.01
Dry matter intake, lb/day	18.03[b]	15.52[a]	20.30[c]	22.73[d]	22.71[d]	0.231	< 0.01
Gain:feed lb/lb	0.15[a]	0.17[b]	0.16[b]	0.17[b]	0.16[b]	0.002	< 0.01
Feed:gain lb/lb	6.69[a]	6.03[b]	6.16[b]	5.98[b]	6.08[b]	0.104	< 0.01
Liver abscess prevalence,[4] %							
Start of growing period	0	0	0	0	0		
End of the growing period	10.4[ab]	11.4[ab]	7.5[b]	20.6[a]	20.0[a]	3.9	0.05

[abcd] Within row, means with unlike superscripts differ ($P < 0.05$).

[1] 50-2 lb: Formulated to contain 50 Mcal of net energy for gain (NEg)/cwt dry matter (DM) and fed to achieve 2 lb of gain/day; 60-2 lb: formulated to contain 60 Mcal of NEg/cwt DM and fed to achieve 2 lb of gain/day; 60-3 lb: formulated to contain 60 Mcal of NEg/cwt DM and fed to achieve 3 lb of gain/day; 64-ALNT: formulated to contain 64 Mcal of NEg/cwt DM and fed *ad libitum* without tylosin phosphate; 64-ALT: formulated to contain 64 Mcal of NEg/cwt DM and fed *ad libitum* with tylosin phosphate (Tylovet 100: Huvepharma, Peachtree City, GA).

[2] Largest standard error of the mean.

[3] Treatment main effect.

[4] Liver abscess prevalence = (steers positive for at least one liver abscess/total head count in pen) × 100.

The Bottom Line: Feeding a 60 NEg diet targeting 3 lb of gain/day reduced LA prevalence without sacrificing efficiency when compared with a high energy *ad libitum* diet. Additionally, inclusion of tylosin phosphate did not reduce liver abscess prevalence in steers fed 64 NEg diets.

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Effects of Dietary Inclusion of an Omega-3 Fatty Acid-based Supplement on Biological Parameters and Sperm Characteristics of Developing Beef Bulls

Allen Schwartz

Objective: This study was to evaluate the impact of including an omega-3 fatty acid-based supplement in the diet of developing beef bulls on growth and semen characteristics.

Study Description: Weaned beef bull calves (n = 39) from the Kansas State Purebred Beef Unit were supplemented with an omega-3 based fatty acid-based supplement through one of three dietary treatments: 0.00 (CON), 0.48 (MOD), or 0.96 (HI) lb/head/day (dry matter basis; extruded flaxseed and algae-based supplement, Better Fed Foods/NBO3, Manhattan, KS). Treatments were applied for 80 days in precision intake management bunks, allowing for the monitoring of performance data. Bulls were evaluated for semen characteristics through breeding soundness exams conducted three times throughout the trial.

Results: There was no difference ($P > 0.05$) for body weight (BW), average daily gain (ADG), or body condition score (BCS) among supplementation groups. Bulls increased from their initial BW of 737 lb at the start of the trial to 1,003 lb at the end. The performance data collected did not differ by supplementation group, indicating that supplementation had no influence on overall growth or body condition. However, as expected, these parameters increased as the experiment progressed. Analysis of sperm characteristics was done with a CASA machine for morphology, motility, and progressive motility of the sperm cells on day 53 or 55, 80, and 101. There were no differences for the percentage of morphologically normal sperm as influenced by omega-3 fatty acid supplementation ($P > 0.05$). There was, however, a lower percentage of morphologically normal spermatozoa in samples from the first collection compared to the collections on day 80 and 101. Interestingly, there was a tendency ($P = 0.10$) for motility to be greater for HI compared to CON bulls for all collections. Likewise, a day effect was observed for motility with sperm collected at day 101 having increased motility ($P < 0.05$) compared to day 53 or 55, and day 80, regardless of treatment. There was no supplementation effect on the progressive motility of sperm, but a day effect was observed, with progressive motility increasing from day 53 or 55 to day 80. However, progressive motility decreased ($P < 0.05$) from day 80 to day 101, representing the first 21 days after omega-3 supplementation was stopped. Ribeye area, rib fat thickness, and intramuscular fat did not differ among supplementation treatments ($P > 0.05$). There was an increase in all carcass traits by the end of the trial due to gain and muscle development. Thermography of the testes, fatty acid composition of blood plasma, and reactive oxygen species in seminal plasma are currently being analyzed to help elucidate the effects that omega-3 supplementation, particularly its antioxidant properties, has on oxidative stress and ultimately sperm function in developing beef bulls.

The Bottom Line: Results suggest that omega-3 supplementation may impact sperm cell motility in young bulls within the inclusion levels and duration of this experiment, which may ultimately help counter the negative effects of overfeeding on semen quality.

For more information, contact:
Nicholas Dias
Beef Cattle Reproduction
785-532-1222
diasnw@ksu.edu

Jason Warner
Cow-Calf Extension Specialist
785-532-1460
jasonwarner@ksu.edu

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Effect of Pyramid Enzyme on the Performance of Finishing Cattle Fed Sorghum-based Diets

Elizabeth Kiselewski

Objective: The objective of this study was to investigate the effects of adding Pyramid PowerGrower Ruminant to sorghum-based finishing diets to assess the effect on diet digestion, feedlot performance, and carcass characteristics.

Study Description: Crossbred steers (n = 280; body weight = 974 lb ± 33.5) were randomly allocated to 36 feedlot pens containing seven (eight pens) or eight (28 pens) animals per pen. At the initiation of the study, steers were vaccinated for viral (Pyramid 5 + Presponse SQ, Boehringer Ingelheim, Duluth, GA) and clostridial (Bovilis Covexin 8; Merck Animal Health, Rahway, NJ) pathogens and treated for internal and external parasites Cydectin (Elanco Animal Health, Indianapolis, IN), and with Draxxin (Zoetis Animal Health, Florham Park, NJ) as a prophylactic. Steers were implanted with Synovex One Feedlot (Zoetis Animal Health, Florham Park, NJ), and received an oral drench of Lactipro (MS Biotec, Wamego, KS). Finishing diets consisted of 59.62% ground sorghum, 25% sorghum-based dried distillers grains with solubles, 12% corn silage, and 3.35% supplement. Treatments consisted of diets with or without added enzyme, and the enzyme treatment provided 1.5 lb of enzyme concentrate per ton of complete feed (86% dry matter basis; Pyramid PowerGrower Ruminant; Pyramid Feeds, Scott City, KS). Cattle were fed once daily, *ad libitum*. After 148 days on feed, steers were transported to a commercial abattoir in Holcomb, KS. Performance measurements included dry matter intake, average daily gain, and feed:gain ratio. On the day of harvest, hot carcass weight and incidence of liver abscesses were assessed. After a refrigeration period of 96 hours, carcass characteristics, including ribeye area, marbling score, 12th rib fat thickness, and U.S Department of Agriculture quality and yield grade, were determined. Nutrient digestibility was determined using acid detergent insoluble ash as an internal marker, and was calculated as:

$$\text{Digestibility \%} = 100 - \left[100 \times \frac{\text{Marker concentration in feed}}{\text{Marker concentration in feces}} \times \frac{\text{Nutrient concentration in feed}}{\text{Nutrient concentration in feces}}\right]$$

Effect of Pyramid PowerGrower Ruminant on feedlot performance and diet digestibility

Item	Control	Enzyme[1]	SEM[2]	*P*-value
Average daily gain, lb	2.50	2.57	0.052	0.34
Feed:gain	10.30	10.02	0.179	0.29
Hot carcass weight, lb	853.4	860.1	4.87	0.34
Dry matter digestibility, %	72.8	74.3	1.63	0.44

[1] Pyramid PowerGrower Ruminant (Pyramid Feeds, Scott City, KS) fed at 1.5 lb per ton of feed (86% dry matter basis). Enzyme blend consisted of the following components: 5,000 HCU/g beta mannanase; 1,200 SKB/g fungal amylase; 600 BAU/g bacterial amylase; 250 XU/g xylanase; 500 HUT/g fungal protease; 800 PC/g neutral protease; and 1,100 CU/g cellulase (values were determined from product specification document provided by Pyramid Feeds).
[2] Standard error of the mean.

The Bottom Line: Adding Pyramid PowerGrower Ruminant enzyme mix to sorghum-based finishing diets resulted in modest, but nonsignificant, improvements in diet digestibility, feedlot performance, and carcass weight.

For more information, contact:
Jaymelynn Farney
Ruminant Nutrition/
Beef Extension Specialist
620-820-6125
jkj@ksu.edu

Jim Drouillard
Feedlot Nutrition
785-532-1204
jdrouill@ksu.edu

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Determining the Effect of Electromagnetic Field-assisted Freezing on Shelf-stability of Beef Striploins

Taylor Looper

Objective: The objective of this study was to determine the effect of electromagnetic (EM) field-assisted freezing on beef color stability during the retail display of previously frozen beef striploins.

Study Description: Striploins were collected from both sides of 12 USDA Choice carcasses and halved. Each half was randomly assigned to 0 kV, 2 kV, 4 kV, or 8 kV and then frozen for 24 hours at -4°F under the designated continuous EM field treatment. Halves were thawed at 36°F for 72 hours and then cut into steaks. One 1-in. and four ½-in. steaks were overwrapped for a 10-day simulated retail display. Instrumental and descriptive color measurements were taken daily. Thiobarbituric acid reactive substances (TBARS) assay for lipid oxidation and oxygen radical absorbance capacity (ORAC) tests for antioxidant capacity were conducted.

Results: During the display period, an interaction between display day and EM treatment was observed for percent discoloration ($P < 0.05$). All treatments remained similar until days 9 and 10, in which the 4 kV samples exhibited less discoloration than the 0, 2, and 8 kV treatments ($P < 0.01$). Main effects for treatment and display were found for L^* (lightness), a^* (redness), and b^* (yellowness; $P < 0.01$). For the display effect, overall a^* and b^* decreased steadily throughout simulated retail display, while samples became increasingly lighter until day 4 and then remained constant ($P < 0.01$). For the treatment effect, a^* and b^* were the highest in the 4 kV group, followed by 0 and 2 kV, while the 8 kV group had the lowest values ($P < 0.01$). L^* values for 0 and 2 kV groups were higher than those from the 4 and 8 kV treatments ($P < 0.01$). A day effect was found for hydrophilic and total ORAC values and for TBARS values, with lipid oxidation and antioxidant capacity increasing over time ($P < 0.01$). A treatment effect was found for hydrophilic and lipophilic ORAC values in which the 4 kV treatment had the highest hydrophilic antioxidant capacity ($P < 0.01$), and the 0 kV treatment measured the highest lipophilic antioxidant capacity ($P < 0.01$).

The Bottom Line: The 4 kV group showed better color stability objectively and subjectively throughout the display period and a higher hydrophilic antioxidant capacity, but the mechanisms behind this finding are unknown.

For more information, contact:
Travis O'Quinn
Meat Science
785-532-3469
travisoquinn@ksu.edu

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

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BEEF CATTLE RESEARCH

The Effects of Aging Period and Freezing Sequence on Desmin Degradation of *Longissimus lumborum, Semitendinosus,* and *Biceps femoris* Steaks

Taylor Dieball

Objective: The objective of this study was to examine the impact of freezing and aging sequence on the degradation of desmin, an indicator of tenderness during post-mortem proteolysis, within three beef muscles across two aging periods.

Study Description: *Longissimus dorsi, semitendinosus*, and *biceps femoris* steaks were fabricated into 1-in. steaks and assigned to one of four treatment combinations: age-then-freeze (AF) for 21 or 28 days or freeze-then-age (FA) for 21 or 28 days. Samples were ground and frozen and then prepared for Western blotting to evaluate desmin degradation. Desmin bands were visualized, and images were captured to quantify intact and degraded desmin.

Results: There was no difference ($P > 0.05$) in intact desmin among the three muscles. The *biceps femoris* had a greater amount ($P < 0.05$) of degraded desmin. A two-way interaction ($P < 0.05$) was observed between freezing treatment and aging period when all muscles were combined. The 28-day FA samples had a lower percentage ($P < 0.05$) of intact desmin compared to the 21-day AF samples. This translated into the 21-day AF samples having the lowest percentage ($P < 0.05$) of degraded protein in bands 3 and 4.

The Bottom Line: Reversing the freezing order increased desmin degradation for steaks aged for 28 days indicating an increase in proteolytic activity. Previous research indicates there were no differences in instrumental tenderness for this project. Thus, even with increased protein degradation, the change was not enough to affect tenderness.

For more information, contact:
Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

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Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

The Cold Chain Question: Effects of Fresh, Frozen, and Thawed Beef Trim on Ground Beef Color and Consumer Perception

Samuel Stickley

Objective: The objective of this study was to evaluate the effect of varying cold chain management strategies on beef trim and the resulting effects on quality characteristics of ground beef patties.

Study Description: Beef trim of varying lean percentages (50%, 80%, and 90%) and cold chain strategies (fresh, thawed, and frozen) were ground and combined to create 10 unique treatments of 80% lean ground beef. These treatments were formed into 1/3 lb patties and subjected to 0 + 5 days of simulated retail display. On each day of display, objective color measurements were taken. On day 0 + 3 of retail display, consumer evaluations were conducted as well as Thiobarbituric Acid Reactive Substances (TBARS) assays to measure lipid oxidation.

Least-squares means for consumer appearance liking, percentage of consumers who would purchase at a retail or discounted price, and Thiobarbituric Acid Reactive Substances (TBARS) assays on day 3 of retail display

Treatment[1]	Appearance liking[3]	% Retail[4]	% Discounted[5]	TBARS[6]
FZ50FZ90	17.78^{e}	3.1^{f}	14.5^{cd}	2.71^{b}
FZ50FR90	81.69^{a}	93.8^{a}	75.0^{ab}	0.68^{e}
FR50FZ90	29.85^{d}	14.1^{e}	23.6^{bcd}	2.26^{c}
FZ80	14.35^{e}	4.7^{ef}	4.9^{d}	3.06^{a}
FR50TH90	59.77^{b}	56.3^{bc}	46.4^{abc}	0.78^{de}
TH50FR90	62.94^{b}	67.2^{b}	76.2^{a}	0.67^{e}
TH50TH90	42.67^{c}	32.8^{d}	39.5^{abc}	0.55^{ef}
FR50FR90	85.66^{a}	95.3^{a}	33.3^{abcd}	0.40^{f}
FR80	84.82^{a}	95.3^{a}	66.7^{abc}	0.65^{e}
TH80	47.81^{c}	45.3^{cd}	40.0^{abc}	1.00^{d}
SEM[2]	5.72	6.2	27.2	0.12
P-value	< 0.01	< 0.01	< 0.01	<0.01

[a-f]Least-squares means within the same column without a common superscript differ ($P < 0.05$).
[1]FZ50FZ90 = frozen 50%: frozen 90%; FZ50FR90 = frozen 50%: fresh 90%; FR50FZ90 = fresh 50%: frozen 90%; FZ80 = frozen 80%; FR50TH90 = fresh 50%: thawed 90%; TH50FR90 = thawed 50%: fresh 90%; TH50TH90 = thawed 50%: thawed 90%; FR50FR90 = fresh 50%: fresh 90%; FR80 = fresh 80%; and TH80 = thawed 80%.
[2]Standard error (largest) of least-squares means.
[3]Sensory scores: 0 = extremely dislike; 100 = extremely like.
[4]Percentage of consumers who would purchase at retail price.
[5]Percentage of the consumers who would not purchase at retail price but would purchase at a discounted price.
[6]TBARS values reported as mg MDA/kg.

The Bottom Line: Results from this study suggest grinding trim from a frozen state has a detrimental effect on ground beef color, oxidation, and the resulting consumer perception.

For more information, contact:
Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

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Agricultural Experiment Station
and Cooperative Extension Service

What's the Beef with Consumer Appeal?

Kelli Garrett

Objective: The objective of this study was to determine the specific color consumers most prefer as the appealing bright, cherry-red beef color.

Study Description: Color samples were created from an original hexadecimal score that was assumed to be the ideal bright, cherry-red beef color, with variations to reflect beef colors consumers may encounter in retail. A 5 × 5 grid was generated from this hex: darker tones extended left, brighter shades upward, lighter hues right, and duller tones downward. Each trait (darkness, brightness, lightness, dullness) included two adaptations, producing nine base color squares. From these nine, four additional hexes were developed by combining two traits within each quadrant. Consumers (n = 192) then completed a survey with 10 randomly selected samples, rating their overall liking and indicating whether they would purchase beef steaks of that color.

Results: For the consumer liking results, samples were compared horizontally based on darkness to lightness and vertically based on brightness to dullness. For horizontal comparisons, each row (A, B, C, D, and E) contained samples numbered 1 to 5, with each compared to the other. For row A, A2 resulted in a higher ($P < 0.05$) overall liking score compared to A1 (darkest) and A5 (lightest), being similar ($P > 0.05$) to A3 and A4. As the hexes became duller than C, the consumers shifted their overall liking scores to favor the lighter hexes. In row E, E3, E4, and E5 were all rated higher ($P < 0.05$) than the darkest hexes of E1 and E2. Additionally, the color samples were analyzed vertically, comparing brightness to dullness, within columns 1, 2, 3, 4, and 5. In column 1, the darkest column, consumers preferred A1, the brightest hex, ($P < 0.05$), and decreased in liking descending to E1 (dullest). For column 3, A3, B3, C3, and D3 were all rated higher ($P < 0.05$) than E3 (dullest). In column 5, B5 was rated higher ($P < 0.05$) than A5 (brightest), D5, and E5 (dullest), with C5 being similar ($P > 0.05$). The consumer purchasing intent results demonstrated similar findings to the consumer liking results.

The Bottom Line: Consumers prefer moderately light and bright shades of beef color over darker hues. As beef color becomes darker, consumers become more critical regardless of brightness.

For more information, contact:
Travis G. O'Quinn
Meat Science
785-532-3469
travisoquinn@ksu.edu

Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

K-STATE Research and Extension

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

BEEF CATTLE RESEARCH

Hey Good Looking, How Have You Been Cooking? The Role of Cooking Method on Cooked Color and Palatability of Beef Steaks

Greta Huber

Objective: This study aimed to determine the palatability and appearance differences between six cooking methods and two degrees of doneness (DOD).

Study Description: Strip steaks were cooked using one of six cooking methods (sous vide, oven, grill, flat-top, clamshell, or air fryer) and to one of two DOD: medium rare (145°F) or well done (170°F). Consumers evaluated six samples using a 100-point line scale for juiciness, tenderness, flavor, overall liking, and overall appearance. Acceptability (acceptable/unacceptable) was determined for each trait. Consumers were asked about the visual expectations by determining (yes/no) if the steak's appearance matched the expected DOD.

Least squares means (n = 12) of consumer (n = 96) sensory panelist palatability ratings[1] for six cooking methods and two degrees of doneness

Degree of doneness	Juiciness	Tenderness	Flavor	Overall liking	Overall appearance
Medium rare, 145°F	68.22^{a}	67.83^{a}	66.23^{a}	67.04^{a}	67.15^{a}
Well-done, 170°F	47.18^{b}	56.40^{b}	56.12^{b}	54.62^{b}	58.43^{b}
SEM[2]	1.92	1.94	2.52	2.48	2.73
P-value	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cooking method					
Sous vide	53.02^{c}	62.41^{b}	60.16^{ab}	60.25	60.51^{bc}
Oven	66.22^{a}	69.16^{a}	63.82^{a}	65.11	66.42^{a}
Flat-top	58.43^{bc}	61.22^{b}	56.88^{a}	62.30	66.42^{a}
Air fryer	53.51^{c}	58.57^{b}	56.88^{b}	56.70	58.98^{c}
Grill	52.94^{c}	58.57^{b}	63.77^{a}	60.47	63.86^{ab}
Clamshell	62.09^{ab}	62.75^{b}	58.03^{b}	60.17	60.56^{bc}
SEM[2]	3.14	2.40	2.56	2.55	2.24
P-value	< 0.01	< 0.01	0.01	0.05	< 0.01

^{abc} Means within the same column without a common superscript differ ($P < 0.05$).

[1]Sensory scores: 0 = extremely dry/tough/dislike; 50 = neither dry nor juicy, neither tough nor tender, neither like nor dislike; 100 = extremely juicy/tender/like extremely.

[2]SEM (largest) of the least squares means.

The Bottom Line: Cooking method influenced appearance ratings and visual expectations of DOD, suggesting that despite similar endpoint temperatures, differences in internal and external color influenced consumer perception and acceptability.

For more information, contact:
Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

K-STATE Research and Extension

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Consumer Preferences for Eating Quality of USDA Prime Beef Differentiated into Tiers

Chesney Effling

Objective: The objective of this study was to evaluate consumer palatability preferences in strip loin steaks of upper 2/3 Prime when compared to Low Prime, upper 2/3 Choice, and Low Choice cooked to three degrees of doneness (DOD).

Study Description: Beef strip loin steaks from four marbling categories (upper 2/3 Prime [Super Prime], Low Prime, Top Choice, and Low Choice) were cooked to one of three DOD (Rare = 140°F, Medium = 160°F, and Well-done = 170°F) on an electric flat top grill. Flip and pull temperatures for the steaks were specific to each DOD. Consumers evaluated samples for juiciness, tenderness, flavor, and overall liking using a 100-point line scale and indicated acceptability for each trait. Responses were recorded using a digital survey on an electronic tablet.

Results: There were no ($P > 0.05$) quality grade × DOD interactions for any consumer-evaluated traits. When evaluating the main effect of quality grade, Super Prime steaks were juicier, more tender, and rated higher for flavor and overall liking ($P < 0.05$) than all other grades. No differences ($P > 0.05$) were observed among Low Prime, Top Choice, and Low Choice for juiciness, flavor, and overall liking. Tenderness ratings were similar ($P > 0.05$) between Low Prime and Top Choice and between Top Choice and Low Choice. However, Low Prime steaks rated higher ($P < 0.05$) than Low Choice steaks for tenderness. A higher percentage of Super Prime steaks were acceptable ($P < 0.05$) for juiciness, tenderness, flavor, and overall liking than all lower grades. No differences ($P > 0.05$) were found in the percentage of samples rated acceptable for tenderness between Low Prime and Top Choice and Top Choice and Low Choice steaks. However, a higher percentage ($P < 0.05$) of consumers rated Low Prime steaks as acceptable for tenderness than Low Choice.

The Bottom Line: These results indicate consumers prefer the eating quality of Super Prime steaks and support the need for a premium program within the Prime grade, offering the beef industry an opportunity to capture added value from this highest grade within beef.

For more information, contact:
Travis G. O'Quinn
Meat Science
785-532-3469
travisoquinn@ksu.edu

Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

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Agricultural Experiment Station
and Cooperative Extension Service

Trained Panel Evaluation of Upper 2/3 Prime Beef Strip Loins

Katelynn Wallace

Objective: The objective of this study was to evaluate trained sensory panel perceptions of beef strip loin steaks representing four marbling categories: Super Prime (moderately abundant and abundant), Low Prime, Top Choice (modest and moderate), and Low Choice (small).

Study Description: Beef strip loins (n = 15/grade) representing four marbling categories were collected from a commercial packing facility, fabricated into approximately 1-in. steaks, and aged 28 days before analysis. Steaks were cooked to one of three degrees of doneness ([DOD]; Rare = 140°F, Medium = 160°F, and Well-done = 170°F) and used for trained panels, Warner-Bratzler shear force (WBSF), slice shear force, pressed juice percentage, and cook loss. Trained panelists (n = 8) rated samples on initial and sustained juiciness, myofibrillar tenderness, connective tissue amount, overall tenderness, and beef flavor intensity.

Results: For trained panelist evaluation, Super Prime steaks received the highest ($P < 0.05$) scores for initial and sustained juiciness, myofibrillar tenderness, overall tenderness, and beef flavor intensity. For initial and sustained juiciness, there were no differences ($P > 0.05$) between Low Prime and Top Choice, or between Top Choice and Low Choice. There were also no differences ($P > 0.05$) among Low Prime, Top Choice, and Low Choice for myofibrillar tenderness, connective tissue amount, and overall tenderness. Well-done samples were rated the lowest ($P < 0.05$) for initial and sustained juiciness, myofibrillar tenderness, and overall tenderness. Super Prime scored the lowest ($P < 0.05$) for connective tissue amount compared to all other quality grades. In all DOD categories, Super Prime had the lowest ($P < 0.05$) WBSF values. Rare Low Prime and Top Choice were similar ($P < 0.05$) for WBSF, and Low Choice was the highest ($P > 0.05$).

The Bottom Line: Super Prime steaks consistently rated higher than the other grades in trained sensory evaluations, indicating that marketing them as a premium tier could boost value and ensure a more consistent, high-quality eating experience.

For more information, contact:
Travis G. O'Quinn
Meat Science
785-532-3469
travisoquinn@ksu.edu

Erin Beyer
Sustainable Fresh Meat Industry
Extension Specialist
832-276-3350
erbeyer@ksu.edu

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

CATTLEMEN'S DAY 2026

BEEF CATTLE RESEARCH

SUMMARY PUBLICATION

This summary publication is intended for distribution at Cattlemen's Day 2026. Full reports are available at ***newprairiepress.org/kaesrr***

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