

CATTLEMEN'S DAY 2011

BEEF CATTLE RESEARCH

SUMMARY PUBLICATION



KANSAS STATE UNIVERSITY
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Nutrient Restriction Does Not Affect Implant Efficacy

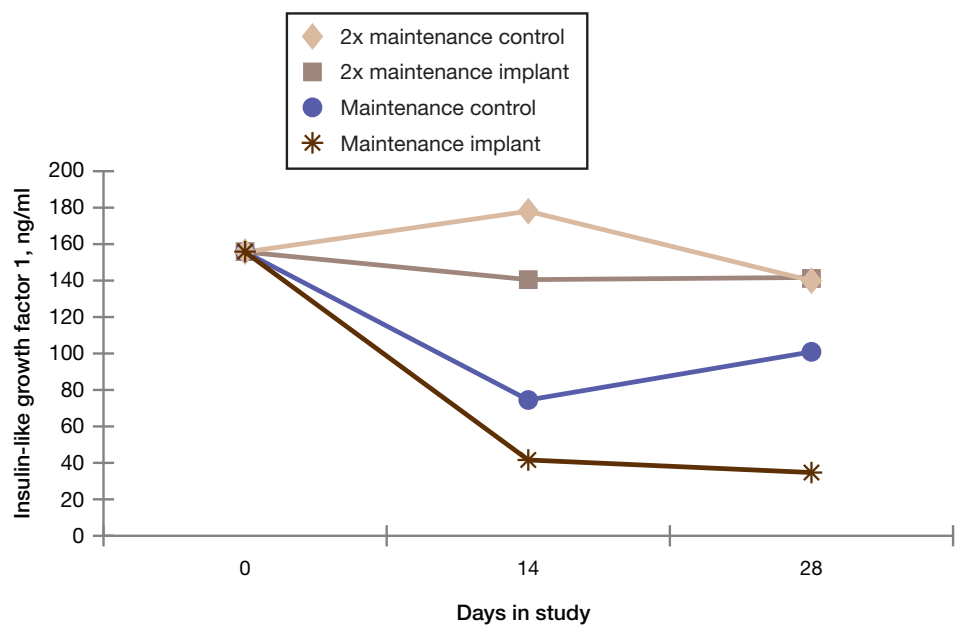
Tiffany Lee

Objective: Evaluate the effect of anabolic implants on animals in a restricted nutritional state.

Study Description: Crossbred steers ($n = 16$; 650 lb) were used in a 2×2 factorial arrangement of treatments to evaluate the effects of nutritional plane and implant status on growth, plasma urea nitrogen, and insulin-like growth factor 1. All calves were individually fed a common, pelleted, complete diet. Four calves each were randomly assigned to receive: (1) implant + 2x maintenance intake; (2) implant + 1x maintenance intake; (3) no implant + 2x maintenance intake; or (4) no implant + 1x maintenance intake. Blood samples were drawn on days 0, 14, and 28 of the study for analysis of plasma urea nitrogen and insulin-like growth factor 1.

Results: Animals fed at 2x the maintenance feeding level had greater ($P < 0.05$) average daily gain and greater plasma concentrations of plasma urea nitrogen and insulin-like growth factor 1 than animals fed at 1x the maintenance feeding level; however, neither the implant nor the interaction between implant and diet showed any effects.

Plasma Insulin-Like Growth Factor 1 as Affected by Level of Feed Intake and Implant Status



The Bottom Line: Nutrient intake, but not implant status, affected plasma hormones and metabolites in cattle under the conditions of our study.

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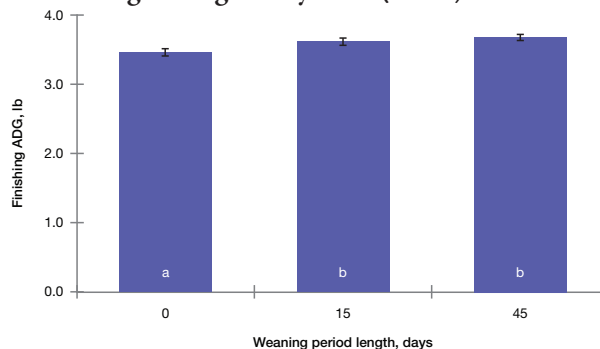
Length of Weaning Period But Not Timing of Vaccination Affects Feedlot Finishing Performance and Carcass Characteristics of Fall-Weaned, Ranch-Direct Beef Calves

Mike Macek

Objective: Compare the effects of vaccinating against bovine respiratory disease before weaning at the ranch of origin or after feedlot arrival for calves weaned 45, 15, or 0 days prior to feedlot arrival.

Study Description: A total of 437 Angus x Hereford calves (average initial weight = 458 ± 54 lb) were weighed, stratified by birth date, and randomly assigned to a preshipment weaning period (i.e., 45, 15, or 0 days prior to shipment). Calves were vaccinated against respiratory disease either at the ranch of origin or at the feedlot and were weaned and fed a common weaning diet. On November 5, 2008, calves were transported and commingled at a commercial auction barn and held for 12 hours. Calves were transported 5 miles to a feedlot, adapted to a receiving ration, and fed for 60 days. Steers were then adapted to a common finishing diet. After 165 days on feed, steers were scanned ultrasonically and assigned to one of three harvest dates to meet an endpoint of 0.45 inches of fat depth over the 12th rib. At harvest, hot carcass weights and incidence of lung lesions and liver abscesses were recorded. Following a 48-hour chill, carcass characteristics including 12th rib fat thickness; ribeye area at the 12th rib; kidney, pelvic, and heart fat; USDA maturity grade; USDA yield grade; USDA quality grade; and marbling score were measured by a trained evaluator.

Effect of the Length of Ranch-of-Origin Weaning Period on Finishing Average Daily Gain (ADG) of Beef Steers



The Bottom Line: A preconditioning period of 45 or 15 days was found to increase feedlot average daily gain and harvest weights compared to no weaning period, but timing of vaccination against respiratory disease did not affect growth performance or carcass merit.

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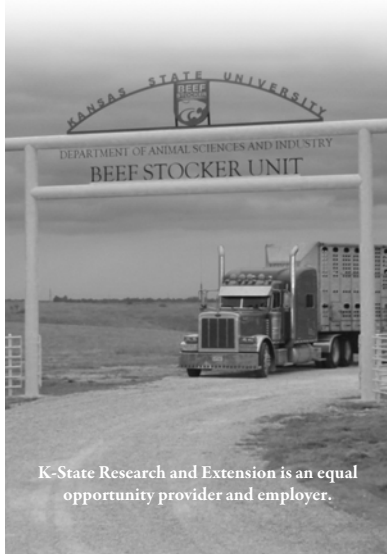


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Relationship Between Ultrasonically Measured Beef Cow Carcass Traits and Lifetime Productivity

Leopoldo A. Pacheco

Objective: Determine if ultrasonically measured intramuscular fat percent or ribeye muscle depth were related to lifetime cow productivity and progeny performance.

Study Description: Angus-cross heifers (n = 160) were managed as a contemporary group and developed in a drylot until breeding at 14 months of age. Heifer intramuscular fat and ribeye muscle depth were measured at approximately 1 year of age. Each year, females were mass-mated following estrous synchronization and exposed to bulls 10 days later for the remainder of a 45-day breeding season. Heifers were managed in a spring-calving, native range-based production system with a 12-month calving interval for the duration of the 4-year study (2004 to 2007). Animals were examined for pregnancy yearly in August and non-pregnant females were removed. Cow intramuscular fat and ribeye muscle depth were categorized into high, medium, and low groups.

Relationship between ribeye muscle depth in heifers at 1 year of age and production measures collected from 2 to 5 years of age

Trait	Ribeye muscle depth group*, mean ± SE		
	Low (<17.24 in.)	Medium (17.24 to 20.48 in.)	High (>20.48 in.)
Calf birth weight, lb	82 ± 2.2	79 ± 0.7	78 ± 1.5
Calf 205-day adjusted body weight, lb	512 ± 14.5	526 ± 9.7	535 ± 12.5
Calving interval, days	351 ± 5.1	344 ± 4.0	346 ± 4.9
Pregnancy rate, %	78.0 ^a	91.0 ^b	88.0 ^b

* Ribeye muscle depth was measured at approximately 1 year of age with ultrasound; heifers were categorized into high, medium, or low ribeye muscle depth groups.

^{ab} Within a row, means without a common superscript differ at P<0.05.

The Bottom Line: Ultrasound measures of ribeye muscle characteristics in yearling heifers can predict some aspects of cow and calf performance. Further analyses appear to be warranted as more production records are obtained from these females.

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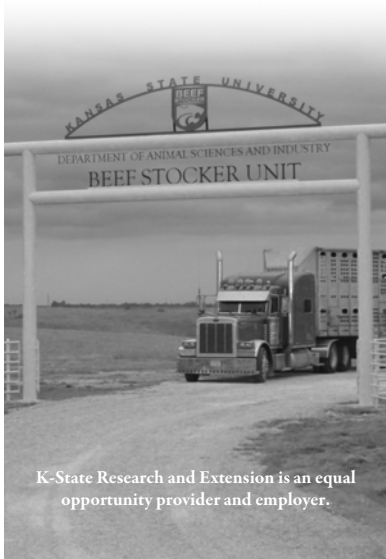


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Optimizing a New 5-day CIDR-CO-Synch Timed Artificial Insemination Program

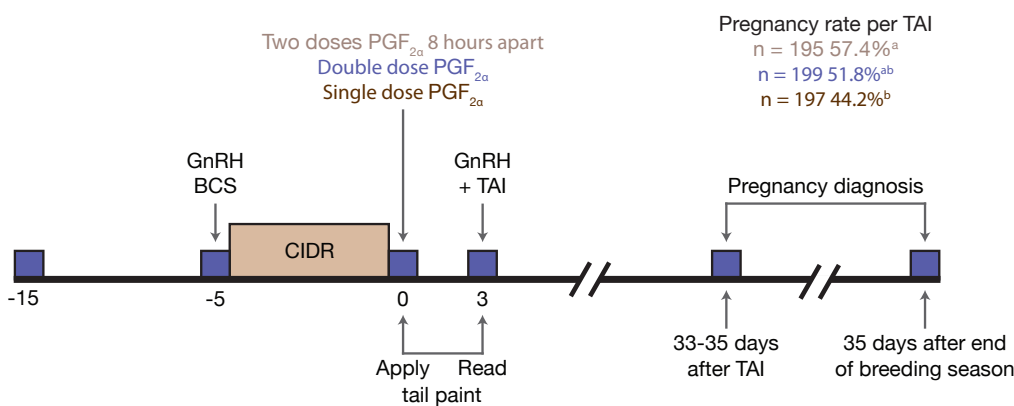
Jeffrey Stevenson

Objective: Determine whether a single large or double dose of prostaglandin-F_{2α} (PGF_{2α}) would be as effective as two doses given 8 hours apart to lyse the corpus luteum in preparation for timed artificial insemination (AI). The control was a single dose of PGF_{2α} at progesterone-impregnated controlled internal drug release (CIDR) insert removal.

Study Description: Lactating beef cows at 3 locations (n = 591) in Kansas were treated with the protocol illustrated in the figure below. Cows were assigned randomly to receive at CIDR insert removal: (1) two doses (2 x 5 mL Lutalyse) of PGF_{2α} 8 hours apart with the first dose given at CIDR insert removal, (2) double dose (10 mL Lutalyse), or (3) single dose (5 mL Lutalyse).

Results: Pregnancy rates per AI are shown in Figure 1. Although the two doses of PGF_{2α} given 8 hours apart produced greater pregnancy rates to the timed AI, subsequent pregnancy loss and overall breeding season pregnancy rates did not differ among treatments.

Five-Day Timed Artificial Insemination (TAI) Program Testing the Appropriate Mode of Treatment of PGF_{2α} to Induce Death of the Corpus Luteum Before TAI



GnRH = gonadotropin-releasing hormone (Factrel); PGF_{2α} = prostaglandin PGF_{2α} (Lutalyse); CIDR = intravaginal progesterone-releasing controlled drug release (EAZI-BREED CIDR); BCS = body condition score.

^{abc} Means having a different superscript differ (P<0.05)

The Bottom Line: The 5-day CIDR-CO-Synch timed AI program is a viable alternative to the standard 7-day program, but it requires administration of two doses of PGF_{2α} to maximize pregnancy rates.

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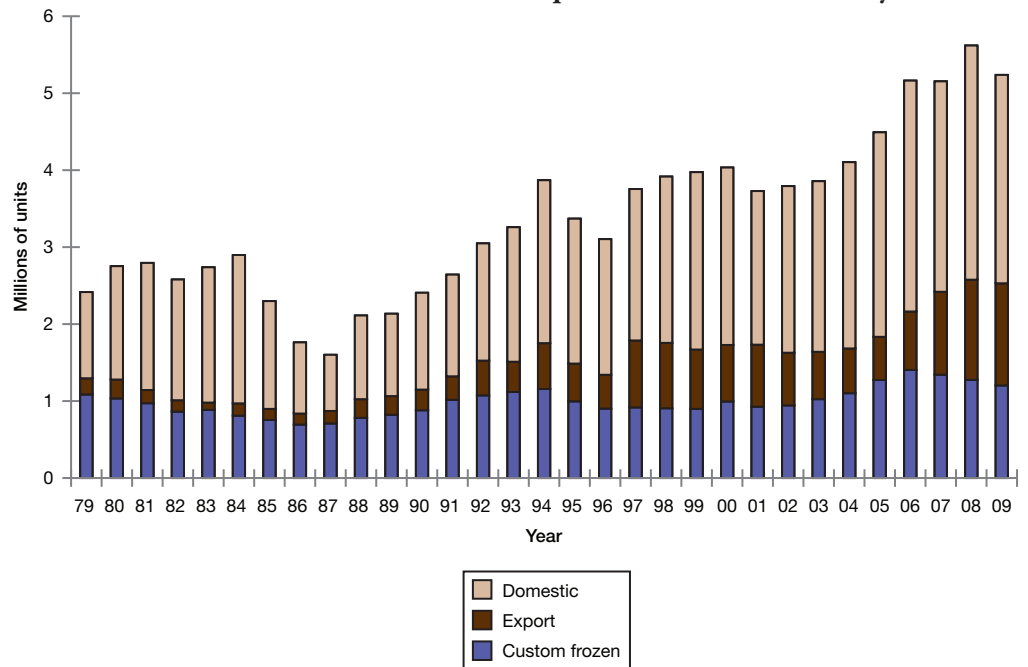
Export Sales of U.S. Beef Semen Increased Faster Than Domestic Semen Sales

Sandy Johnson

Objective: Examine trends in domestic, custom frozen, and export sales of semen over time and their relationship to feeder calf prices and beef cow inventories in the United States.

Study Description: Data from 1979 to 2009 on domestic, custom frozen, and export semen sales were obtained from the National Association of Animal Breeders website. We used USDA January 1 beef cow inventory records and 500- to 600-lb steer calf prices in Oklahoma City, OK, as reported by the Livestock Marketing Information Center. We utilized simple correlations and multiple regression models to describe relationships.

Units of Semen Custom Frozen, Exported, or Sold Domestically



The Bottom Line: Demand for beef genetics available through commercial semen providers in the United States has increased since 1979 and has grown more rapidly outside the country than inside. Domestic use of semen is highly correlated with feeder calf prices and has shown a modest upward trend since 1979.

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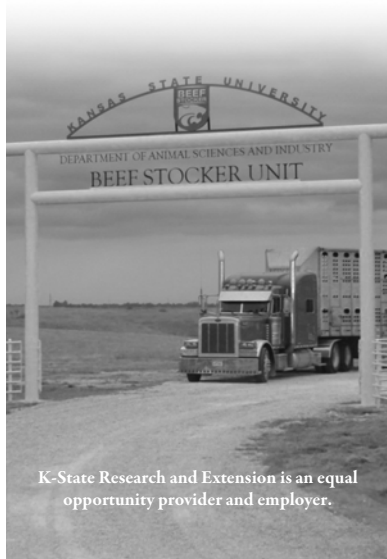
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Grazing Wheat Did Not Reduce Beef Cow Pregnancy Rates

Sandy Johnson

Objective: Determine if grazing lush wheat before and during the breeding season reduces pregnancy rates of spring-calving cows as compared to cows grazing native rangeland.

Study Description: Cows were assigned to graze either mixed-grass native rangeland from early spring until late fall in a season-long continuous grazing system (Native) or winter annual wheat in early spring followed by mixed-grass native rangeland until late fall in a seasonal complementary forage system (Wheat). Fixed-timed artificial insemination (AI) was conducted on all cows following a melengestrol acetate-Select protocol. Cleanup bulls were turned in 10 days after fixed-timed AI. Pregnancy was determined by transrectal ultrasonography 30 to 40 days after timed AI to determine pregnancy rate to AI and on days 76 to 141 to determine final pregnancy rate.

Results: Cows grazing wheat before and during breeding had similar pregnancy rates to AI as cows that grazed on native rangeland prior to and during breeding. Average pregnancy rates to fixed-time AI over all years were 51.7% and 57.7% for Wheat or Native cows, respectively. Final pregnancy rate was also similar between the two grazing groups, and over all years averaged 94.4 and 95.9% for the Wheat and Native groups, respectively.

Pregnancy rate to fixed-time artificial insemination (AI) and final pregnancy rate (AI plus natural service) for cows grazing either wheat pasture or native mixed-grass rangeland for 21 to 50 days prior to day of AI

Year	AI pregnancy rate, %		Final pregnancy rate, %	
	Wheat	Native	Wheat	Native
2001	43.3	35.0	91.7	97.5
2002	50.8	66.7	91.5	93.3
2003	52.5	64.4	94.8	100.0
2004	63.3	60.0	95.0	91.1
2005	47.9	60.0	100.0	97.8
Average	51.7	57.7	94.4	95.9

The Bottom Line: This trial showed no evidence that the high-protein diet of wheat pasture reduces pregnancy rate of beef cows. However, because timing of the breeding season remained constant, protein content of diet may have moderated prior to breeding.

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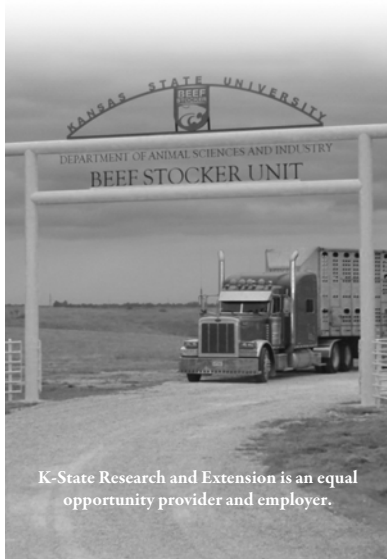


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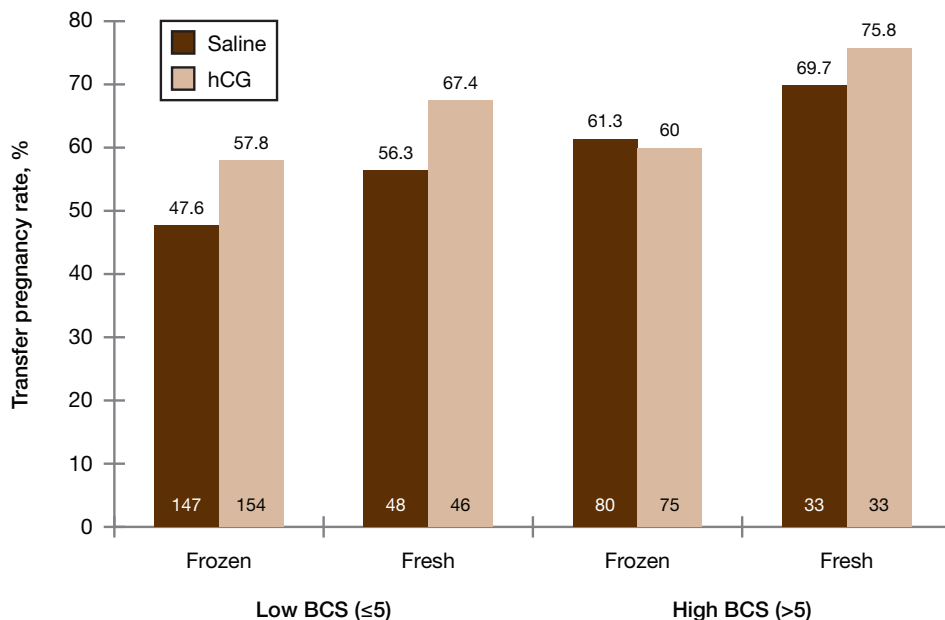
Human Chorionic Gonadotropin Increases Embryo Transfer Pregnancy Rates

Jeffrey Stevenson

Objective: Monitor formation and retention of accessory corpora lutea, progesterone concentrations, and pregnancy transfer rates in embryo recipients that received human chorionic gonadotropin (hCG) or saline at the time of embryo transfer.

Study Description: Mature beef cows at 3 locations (n = 719) received 1 fresh or frozen-thawed embryo 7 days post-estrus. At transfer, recipients alternately received either 1,000 IU hCG (1 mL, Chorulon; Intervet, Inc., Millsboro, DE) or 1 mL saline and were assigned a body condition score (BCS; 1 = thin, 9 = very fat). Pregnancy diagnoses were performed by transrectal ultrasonography at 35 and 65 days (mean) post-estrus at which time blood was sampled to measure progesterone in blood serum.

Results: Treatment with hCG (P=0.026) at embryo transfer and transfer of fresh embryos (P=0.016) increased the likelihood of pregnancy at the first diagnosis. Further, recipients having BCS >5 at the time of transfer tended (P=0.074) to have greater pregnancy rates than recipients having BCS ≤5.



The Bottom Line: Administering 1 mL Chorulon (1,000 IU human chorionic gonadotropin) to embryo transfer recipients at the time of embryo transfer improved transfer pregnancy rates by 7.9%.

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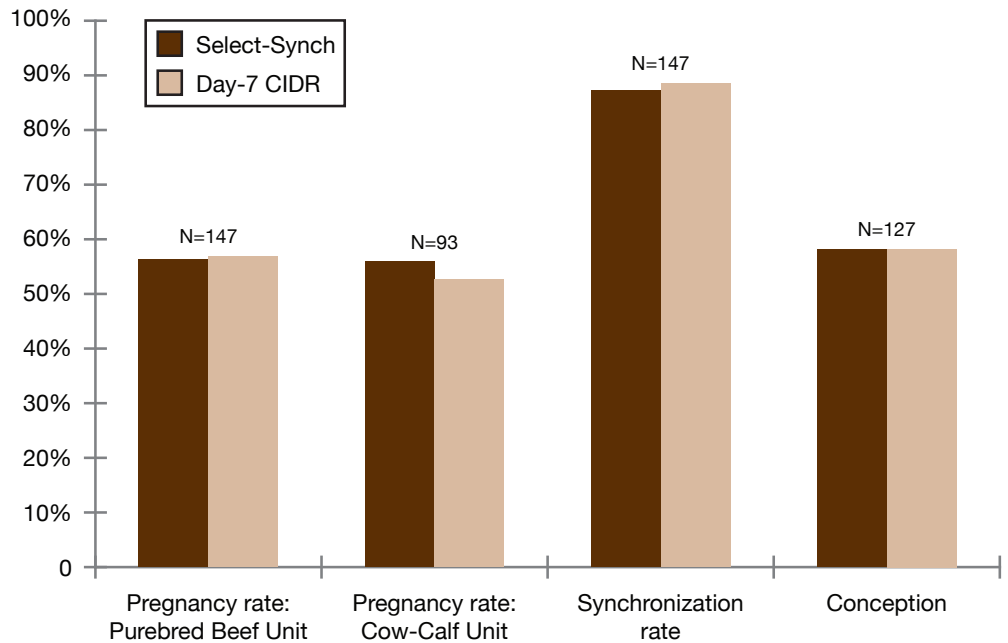
Is GnRH Necessary at CIDR Insertion Using a 7-Day CIDR Synchronization Protocol for Beef Heifers?

Douglas Eborn

Objective: Compare heat response and fertility in heifers with or without gonadotropin-releasing hormone (GnRH) administration at the time of progesterone-impregnated controlled internal drug release (CIDR) insertion.

Study Description: Many producers use an injection of GnRH when they insert a CIDR for estrous synchronization. To test the effectiveness of this strategy, we compared groups of heifers synchronized and inseminated with or without an injection of GnRH when the CIDR is inserted.

Results: We found similar pregnancy rates, synchronization rates, and conception rates regardless of whether an initial injection of GnRH was given using a 7-day CIDR protocol in beef heifers.



The Bottom Line: An injection of GnRH is not necessary when implementing a 7-day CIDR protocol synchronization method for beef heifers.

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Reproduction of Heifers Sired by High or Low Residual Feed Intake Angus Bulls

Erika Blair

Objective: Compare reproductive performance of heifers sired by bulls with high or low estimated breeding values for residual feed intake (RFI).

Study Description: Angus-based commercial cows were bred to Angus sires that had low (feed-efficient) or high (feed-inefficient) estimated breeding values for RFI published by the Angus Society of Australia. Feed intake of heifer offspring ($n = 92$) was measured. RFI of the heifers was determined by regressing actual feed intake on mid-test metabolic body weight and average daily gain. Estrous cycles were synchronized and heifers bred once by artificial insemination (AI) followed by a 60-day natural mating period. Reproductive traits examined in the dams were age at first calving, breeding treatment, pregnancy results, calf birth weight, calf sire, calving days, whether the pregnancy was AI or natural, and first service conception rate.

Results and Discussion: Sire RFI did not affect first service or overall conception rate of daughters. Heifers sired by low RFI (feed-efficient) bulls tended ($P < 0.10$) to calve earlier in the season than heifers sired by high RFI (feed-inefficient) bulls. RFI bulls with low (feed-efficient) phenotypic RFIs tended to have lower first service conception rates than heifers with high (feed-inefficient) RFIs. Overall pregnancy rates were similar between feed-efficient and feed-inefficient heifers. Calf birth weight and heifer phenotypic RFI were inversely related (-0.79 ; $P < 0.09$), indicating a tendency for low RFI (feed-efficient) heifers to have heavier calves at birth. Heifer RFI and calving data, age at first calving, and calf birth weight were not related.

The Bottom Line: No differences occurred in pregnancy rate, but a favorable relationship exists between RFI and calving date for calves sired by efficient RFI bulls. Further research should examine relationships between RFI and female fertility traits.

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Zilpaterol-HCl Reduces Urinary Excretion of N-tau-methylhistidine by Finishing Steers

Derek Brake

Objective: Measure urinary excretion of N-tau-methylhistidine and creatinine to assess the effects of zilpaterol-HCl (Zilmax) on skeletal muscle protein degradation in growing cattle fed corn-based diets supplemented with different sources of protein.

Study Description: Twelve steers were used to measure the effects of zilpaterol-HCl and dietary nitrogen supplementation on urinary N-tau-methylhistidine excretion. Steers were fed one of three corn-based diets: control, urea, or dried distillers grains with solubles. Zilmax was fed to half of the steers. Urinary creatinine excretion was used to estimate skeletal muscle mass and N-tau-methylhistidine was used to estimate skeletal muscle protein degradation.

Results: The ratio of N-tau-methylhistidine to creatinine in urine was lower for steers receiving Zilmax than for those not receiving Zilmax. This implies that fractional rates of muscle protein degradation were reduced by Zilmax. Dietary protein did not affect muscle protein degradation.

The Bottom Line: The reduction in rates of muscle protein degradation in response to Zilmax could explain some of Zilmax's negative effects on meat tenderness.

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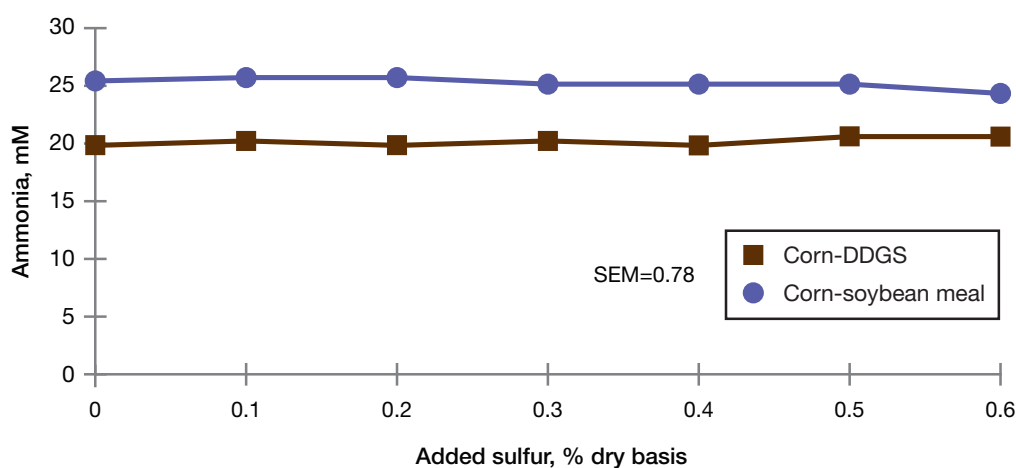


Dietary Sulfur Concentration Has No Effect on *In Vitro* Fermentative Activity of Mixed Ruminal Microorganisms

Solange Uwituze

Objective: Investigate the effects of added sulfur on *in vitro* dry matter disappearance, volatile fatty acid profiles, and ammonia concentrations from substrates containing different sulfur concentrations when fermented by mixed ruminal microorganisms from a steer fed a diet based on corn and alfalfa.

Study Description: Sulfur from sodium sulfate was added to substrates at 0, 0.1, 0.2, 0.3, 0.4, 0.5, or 0.6% of substrate (dry basis). Substrates consisted of a 94:4.5:1.5 mixture of ground corn, soybean meal, and urea, or a 69.4:30.6 mixture of ground corn and dried distillers grains with solubles (DDGS). Varying concentrations of sulfur were added to substrates containing 14.4% crude protein (dry basis) prior to being incubated in culture tubes containing a 2:1 mixture of artificial saliva and clarified ruminal fluid from a steer fed a diet based on corn and alfalfa. Three tubes per substrate and sulfur concentration were incubated for 24 hours at 104°F. After 24 hours of fermentation, tubes were chilled in an ice bath and centrifuged, and the supernatant was used for analysis of volatile fatty acid profiles and ammonia concentrations. Pellets of residue were dried and used to determine *in vitro* dry matter disappearance.



Substrate \times sulfur, $P=0.32$; sulfur effect, $P=0.95$; substrate effect, $P<0.01$

The Bottom Line: Elevated dietary sulfur concentration had no effect on fermentative activity of mixed ruminal microorganisms.

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Forage Selection Preferences of Experienced Cows and Naïve Heifers Grazing Native Tallgrass Range in Winter

Nancy Aubel

Objective: Characterize differences in diet selection between experienced multiparous and naïve primiparous beef cows grazing dormant, native tallgrass pastures during winter.

Study Description: Cows were randomly grouped by parity status and randomly assigned to graze four of eight pastures in the Kansas Flint Hills in four consecutive 48-hour periods. Fecal samples were collected from each animal during each period. Samples were prepared and viewed on a microscope slide to determine the frequency of appearance of plant fragments, which was assumed to be equivalent to prevalence in grazed diets.

Diet botanical composition of primiparous and multiparous beef cows grazing native tallgrass range in winter

Item	Primiparous	Multiparous	SEM	P-value
Grasses, % of diet dry matter	64.9	69.0	1.40	0.09
Forbs, % of diet dry matter	35.1	31.0	1.40	0.09

Diet botanical composition over time of cows grazing native tallgrass range in winter

Item	Period 1	Period 2	Period 3	Period 4	SEM	P-value
Grasses, % of diet dry matter	60.4	65.6	68.9	73.0	1.78	< 0.01
Forbs, % of diet dry matter	39.6	34.5	31.1	27.1	1.78	< 0.01

The Bottom Line: Differences observed in diet selection patterns between multiparous and primiparous cows during a short-term winter grazing period could be indicative of differences in long-term foraging strategies.

View the complete research report online at: www.asi.ksu.edu/cattlemensday

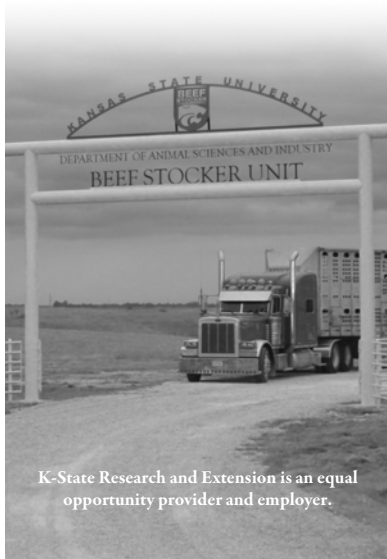
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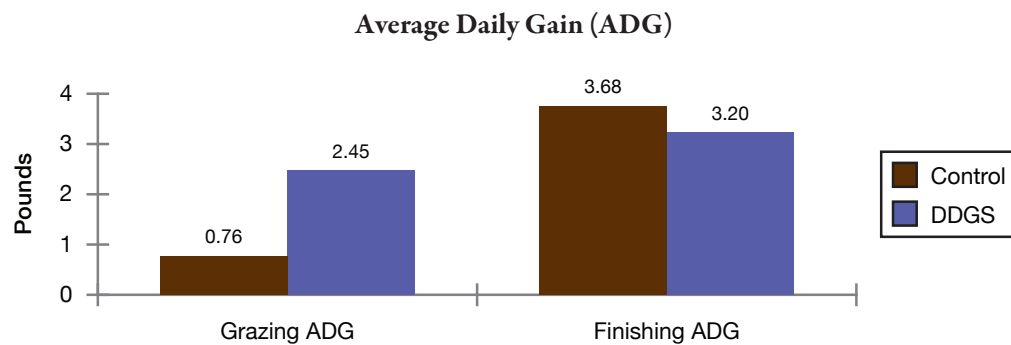


Supplementing Dried Distillers Grains with Solubles to Stocker Cattle Grazing Late-Season Forages Improves Animal Performance and Carcass Characteristics

Andrew Stickel

Objective: Investigate the impact of feeding dried distillers grains with solubles (DDGS) to heavy stocker cattle during late-season grazing on animal performance and subsequent carcass characteristics.

Study Description: Crossbred steers (n = 144; average initial body weight = 808 ± 40 lb) grazed mature and dormant native tallgrass pasture for 90 days. Treatments while grazing were no supplementation or supplementation with DDGS at 1% of body weight (dry basis). Cattle were supplemented daily. Cattle were then placed on feed and carcass characteristics were evaluated after harvest.



Effects of grazing supplementation on carcass characteristics

Trait	Control	DDGS
Hot carcass weight, lb	729.3 ^a	800.1 ^b
Dressing percentage	61.1	61.7
Yield grade	2.1	2.2
Fat thickness, in.	0.27	0.32
Ribeye area, in. ²	13.24 ^a	14.01 ^b
Marbling score ¹	387.6	399.6

¹ Marbling score: small = 400 to 499; slight = 300 to 399

^{ab} Means within a row with different superscripts differ (P<0.05).

The Bottom Line: Stocker operators can supplement DDGS while grazing late-season native tallgrass pastures to increase weight gain and improve carcass red meat yield without affecting quality or yield grade. Feedlot operators should be aware that supplemented stocker cattle will be slightly less efficient than non-supplemented stocker cattle during the finishing phase.

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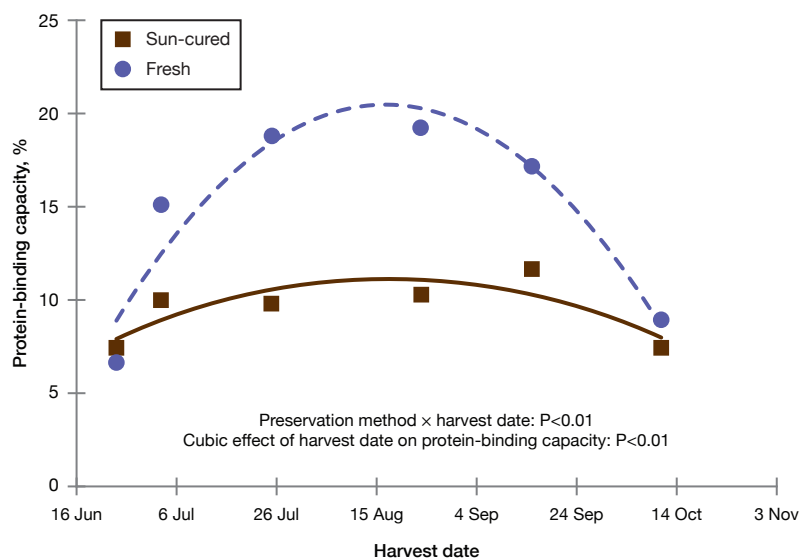
Sun-Curing and Harvest Maturity Impacts Concentration and Protein-Binding Capacity of Condensed Tannins in *Sericea Lespedeza* (*Lespedeza cuneata*)

Gregory Eckerle

Objective: Examine changes in condensed-tannin concentrations and in protein-binding capacity of condensed tannins throughout the growing season in both sun-cured and fresh sericea lespedeza.

Study Description: This study was conducted in the summer of 2009. Samples were collected from a single 160-acre pasture. Composition of the pasture was determined using a modified step point technique, and sericea lespedeza comprised 19.3% of all plants encountered during the procedure. Samples were collected in a 4-week period to represent the single stem, branch stem, budding, flowering, and senescent stages of sericea growth. Samples were either sun-cured in burlap sacks or frozen immediately. All samples were dried and analyzed for concentrations of condensed tannins and protein-precipitable phenolics.

Results: Sun-curing sericea lespedeza dramatically reduced the concentrations of condensed tannins and protein-precipitable phenolics. The greatest concentrations of condensed tannins and protein-precipitable phenolics occurred in August, which corresponds to the flowering stage of sericea growth.



The Bottom Line: Understanding how drying and plant growth stage influence condensed tannin concentrations and protein-binding capacity of sericea lespedeza could lead to more effective research models for the study of sericea lespedeza intake by ruminant livestock.

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Voluntary Intake of Prairie Hay Contaminated with *Sericea Lespedeza* (*Lespedeza Cuneata*) by Beef Cows

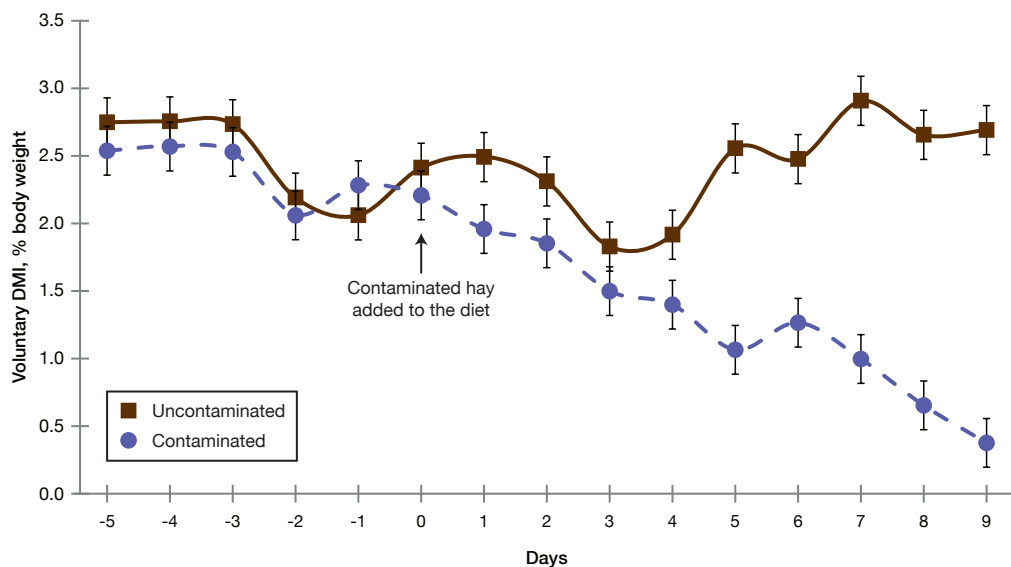
Gregory Eckerle

Objective: Compare intake of tallgrass prairie hay by beef cows when hay was either uncontaminated or heavily contaminated by sericea lespedeza.

Study Description: Twenty-four mature beef cows were housed in a single pen and were fed individually either tallgrass prairie hay contaminated with sericea lespedeza (approximately 30% by weight) or uncontaminated tallgrass prairie hay. Both sources of hay had similar crude protein (5.5 vs. 5.4%) and acid detergent fiber (41.0 vs. 39.8%) concentrations.

Results: Both groups of cows were fed uncontaminated forage during the first 5 days of the trial (days -5 to -1). We observed no differences in hay intake during this period. Contaminated hay was substituted for uncontaminated hay on day 0, and voluntary intake of hay immediately declined.

Effects of *Sericea Lespedeza* Contamination on Voluntary Dry Matter Intake (DMI) of Tallgrass Prairie Hay by Beef Cows



The Bottom Line: Tallgrass prairie hay heavily contaminated with sericea lespedeza may be a useful model for the study of the appetite-suppressing effects of sericea. Furthermore, the major source of appetite suppression by sericea lespedeza in sun-cured form was attributed to the post-ingestive consequences of anti-nutritional factors, possibly condensed tannins, rather than anti-palatability factors.

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ANIMAL SCIENCES AND INDUSTRY



Effects of Prepartum Ruminally Protected Choline Supplementation on Performance of Beef Cows and Calves

Leopoldo A. Pacheco

Objective: Evaluate the effects of prepartum ruminally protected choline supplementation on cow and calf performance.

Study Description: Angus-cross cows and heifers ($n = 438$; initial body weight = 1,173 lb) were blocked by age, body condition score, and expected calving date and randomly assigned to one of two supplement treatment groups: (1) a 40% crude protein mixture of corn and soybean meal with ruminally protected choline, or (2) a 40% crude protein mixture corn and soybean meal with no ruminally protected choline. Treatments were applied during the 60-day period immediately preceding the earliest predicted calving date. Cows were fed 5.2 lb per head per day of their respective supplement 6 times per week. The average daily feeding rate of choline for treated cows was 0.16 oz per cow per day. Body weights, body condition scores, and ultrasonically measured ribeye muscle characteristics of cows and body weights of calves were recorded at intervals from January to October.

Performance response of calves born to beef cows fed ruminally protected choline (RPC) or control (CON) supplements during the 60-day prepartum period

Item	RPC	CON	SE	P-value
Early average daily gain (ADG; birth to 08/01), lb	2.4	2.4	0.02	0.09
Late ADG (08/02 to 10/05), lb	2.3	2.2	0.02	0.05
Overall ADG (birth to 10/05), lb	2.3	2.3	0.01	0.64
Adjusted 205-day body weight, lb	576.4	571.1	3.5	0.51

The Bottom Line: Under the conditions of our study, prepartum supplementation with ruminally protected choline had only minor effects on performance of beef cows and calves.

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Marination Technique Influences Whole Muscle Beef Jerky Salt Content and Flavor Intensity

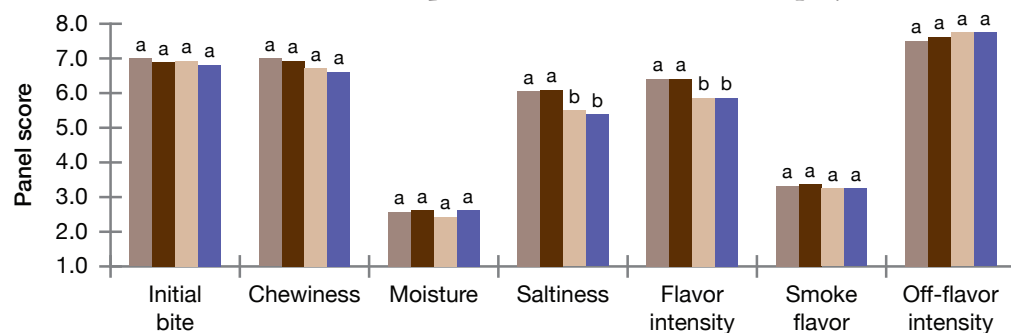
Garrett R. Skaar

Objective: Evaluate how marination technique affects beef jerky by: (1) comparing composition and sensory attributes of beef jerky processed using 24-hour soaking marination or 20-minute vacuum tumble marination, and (2) determining whether a liquid smoke-based anti-mold spray alters the flavor of beef jerky.

Study Description: Beef jerky was produced using beef inside round and a marinade formulation. The round was sliced and soaked in a tub for 24 hours or vacuum tumbled for 20 minutes. After thermal processing, a liquid smoke-based anti-mold spray was applied to half of the product from each marination technique. Final production treatments were: (1) soaked, not sprayed (S); (2) soaked, sprayed (SS); (3) tumbled, not sprayed (T); and (4) tumbled, sprayed (TS). Three replications were prepared.

Results: Product marinated by soaking was found to have a 2% higher salt content. The sensory panel also assigned higher saltiness and flavor intensity scores to the jerky that was made with the 24-hour soaking marination method compared with tumbled jerky.

Trained Panel Sensory Evaluation[†] of Beef Jerky Marinated by 24-Hour Soaking or 20-Minute Vacuum Tumbling*, with and without a Liquid Smoke-Based Anti-Mold Spray*



^{ab} Bars within a sensory attribute labeled with a different letter differ (P<0.05).

* S – 24-hour soak marinated; SS – 24-hour soak marinated, anti-mold spray; T – 20-minute vacuum tumble marinated; TS – 20-minute vacuum tumble marinated, anti-mold spray.

[†] A score of 8 for all traits would describe product as extremely firm, chewy, moist, and salty with an intense flavor, abundant smoke flavor, and no off-flavor.

The Bottom Line: Vacuum tumbling as a form of marination for jerky saves time compared with soaking beef slices for 24 hours and may slightly alter jerky attributes. More marinade is needed during tumbling if an equal level of marinade pickup is expected compared with soaking.

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ANIMAL SCIENCES AND INDUSTRY



Increasing Days on Feed for Heavy Short-Fed Stocker Cattle Improves Carcass Characteristics

Andrew Stickel

Objective: Investigate the impact of a shortened, high-concentrate feeding period on carcass characteristics and meat quality traits of heavy stocker cattle.

Study Description: Crossbred steers ($n = 144$; 955 ± 78.5 lb) were randomly assigned to one of three treatments consisting of 75, 100, and 125 days on feed. Cattle were fed a high-concentrate diet once daily and had access to clean, fresh water. Cattle were harvested at a commercial abattoir and carcass data collected 24 to 48 hours postmortem. Additionally, rib and plate sections were collected from each treatment day and evaluated for carcass composition, instrumental lean and fat color, tenderness, and sensory traits.

Feedlot performance and carcass characteristics of heavy stocker cattle fed for 75, 100, or 125 days

Trait	Days on feed		
	75	100	125
Average daily gain, lb	3.42	3.52	3.37
Average daily dry matter intake, lb	27.67	27.30	27.82
Gain:feed ratio	0.125	0.128	0.120
Total gain, lb	257.7 ^a	354.4 ^b	419.1 ^c
Hot carcass weight, lb	704.7 ^a	758.6 ^b	820.9 ^c
Dressing percentage	60.5	61.7	62.0
Yield grade	2.1	2.1	2.4
Fat thickness, in.	0.27 ^a	0.27 ^a	0.35 ^b
Ribeye area, in. ²	13.05 ^a	13.71 ^{ab}	14.13 ^b
Marbling score ¹	363.6 ^a	407.1 ^b	409.5 ^b

¹ Marbling score: small = 400 to 499; slight = 300 to 399.

^{abc} Means within a row with different superscripts differ ($P < 0.05$).

The Bottom Line: Producers can place heavy yearling stocker cattle on a high-concentrate diet for 75 to 125 days with minimal effect on performance and sensory traits. However, cattle should be placed on feed for a minimum of 100 days to optimize USDA quality grade.

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Tenderness and Intramuscular Lipid of Most Major Muscles from *Bos Indicus* Cattle is Less than for *Bos Taurus* Cattle

Carrie Highfill

Objective: Compare carcass traits between Hereford x Angus crossbred cattle with those containing at least 50% Brahman or Sahiwal inheritance and validate Warner-Bratzler shear force of both steaks and roasts and proximate composition of 10 different muscles from these cattle.

Study Description: Twenty *Bos taurus* (Hereford x Angus) and 20 *Bos indicus* (Brahman and Sahiwal sires mated to Hereford x Angus crossbred cows) were used. Calves were weaned at approximately 200 days of age, preconditioned 30 days, and then fed a corn and corn silage diet until harvest after 169 days on feed. Carcasses were evaluated by USDA graders for carcass traits. At 8 days postmortem, right sides were fabricated to obtain the *supraspinatus* (SS), *infraspinatus* (IF), and *triceps brachii* (TB) from the chuck; *deep pectoral* (DP) from the brisket; *longissimus lumborum* (LL), *psoas major* (PM), and *gluteus medius* (GM) from the loin; and *biceps femoris*, *semitendinosus* (ST), and *semimembranosus* (SM) from the round. Muscles were vacuum packaged and aged until 10 days postmortem. Warner-Bratzler shear force was measured on cores from steaks and roasts cooked to 150°F internal temperature.

Results: *Bos taurus* carcasses were heavier, fatter, and had larger ribeye areas than *Bos indicus* carcasses ($P < 0.05$). In addition, *Bos taurus* carcasses had higher marbling scores ($P = 0.08$). Yield grade tended to be higher for *Bos taurus* but it was not statistically significant. Intramuscular fat percentage was higher in all *Bos taurus* muscles. For all muscles except TB, roasts took less time per oz to reach the final end point temperature than steaks. Cooking losses were less ($P < 0.05$) for TB, LL, and SM steaks than for roasts and greater ($P < 0.05$) for PM and GM roasts than steaks. In the forequarter, tenderness of SS and IF muscles was not affected by breed or cut size. *Bos indicus* TB muscles were less tender ($P < 0.05$) than *Bos taurus*, and DP muscles cooked as roasts were less tender ($P < 0.05$) than those cooked as steaks. *Bos taurus* LL, GM, and SM muscles cooked as steaks were more tender than those from *Bos indicus*, and *Bos taurus* LL, GM, ST, and SM muscles cooked as roasts were more tender ($P < 0.05$) than those from *Bos indicus*.

The Bottom Line: Carcasses from *Bos indicus* cattle were lighter and had less fat cover, smaller ribeyes, and less marbling than *Bos taurus* cattle. Seven of the ten muscles studied were more tender for *Bos Taurus* cattle when cooked as steaks, roasts, or both cut sizes.

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SUMMARY PUBLICATION

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