

# Beef Research Highlights



**2008**



Kansas State University  
Agricultural Experiment Station  
and Cooperative Extension Service



# Beef Research Highlights 2008

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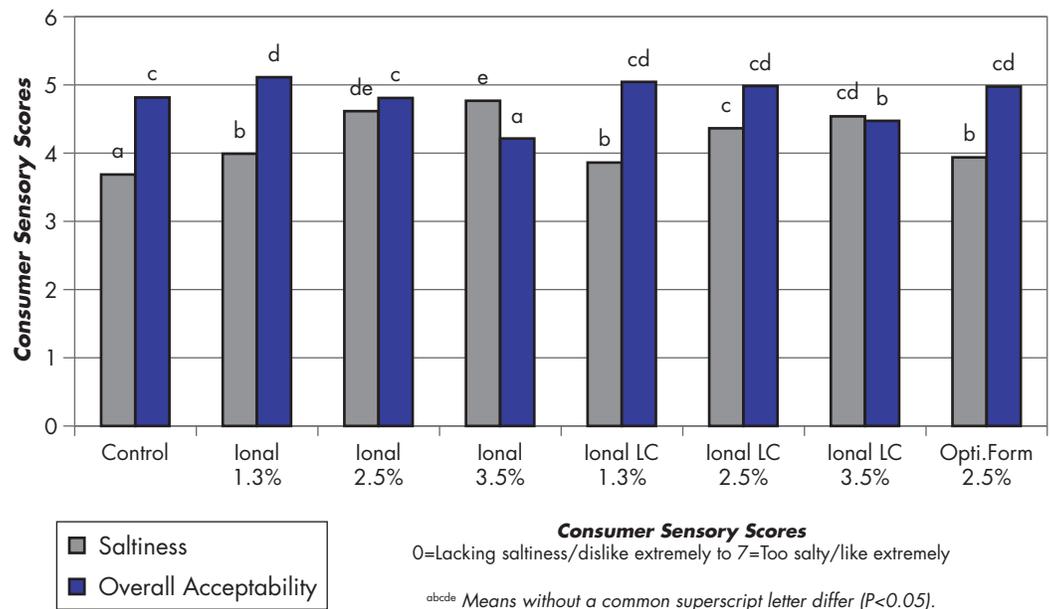
## Antimicrobial Ingredients Affect Beef Snack Stick Quality

**Jennifer Gunderson**

**Objective:** Determine if various levels of ingredients that inhibit the presence or growth of *Listeria monocytogenes* impact quality characteristics when included in beef snack stick formulations.

**Study Description:** One of three anti-listerial ingredients: Ionol™, Ionol™ LC, or PURSAL Opti.Form® PD4 was mixed into a snack stick batter. Treatments were: 1) no agent (control); 2 to 4) 1.3, 2.5, or 3.5% Ionol; 5 to 7) 1.3, 2.5, or 3.5% Ionol LC; 8) 2.5% Opti.Form. Snack sticks were thermal processed, packaged, and placed in storage (day 0). On day 30, consumers evaluated snack stick samples for saltiness and overall acceptability (0 = lacking saltiness/dislike extremely to 7 = too salty/like extremely).

### Consumer Sensory Scores for Beef Snack Sticks



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**The Bottom Line:** Incorporating anti-listerial ingredients into beef snack sticks at lower percentages does not negatively impact consumer acceptance of perceived saltiness and overall desirability.

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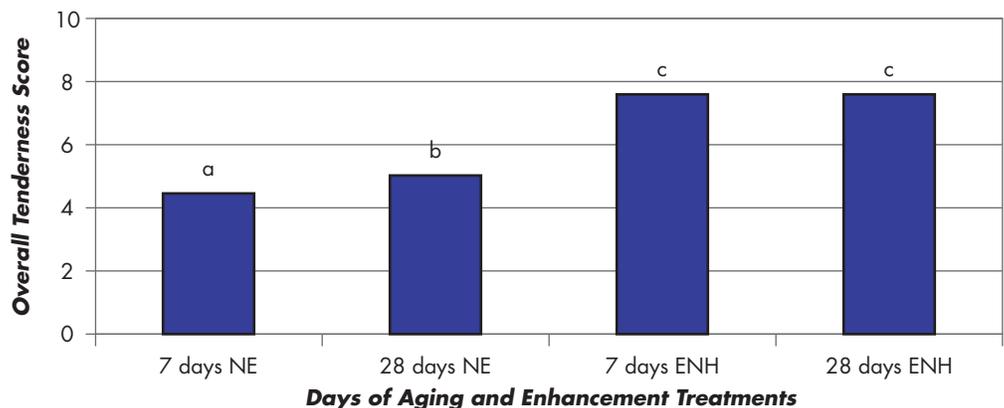
## Blade Tenderization in Combination with Injection Enhancement Containing an Enzyme Increases Tenderness of Strip Steaks from Fed Cull Cows

**Shanna Hutchison**

**Objective:** Determine the effects of days of aging and an enhancement protocol on tenderness of strip loin steaks from fed cull cows.

**Study Description:** Strip loins from both carcass sides were removed from 31 fed cull-cow carcasses. Strip loins were aged for 7 or 28 days, divided in half, and frozen. One half from each strip loin was thawed and either blade tenderized and injected with a typical industry enhancement containing bromelin or not enhanced. Sensory panel, Warner-Bratzler shear force, and moisture loss evaluations were conducted.

### Sensory Panel Tenderness



**Tenderness Score**  
1=Extremely tough 8=Extremely tender

**Days of Aging and Enhancement Treatments**  
NE=Not enhanced ENH=Enhanced

*abc Means without a common superscript letter differ (P<0.05).*

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**The Bottom Line:** Aging cow steaks for 28 days to increase tenderness is not necessary when blade tenderization and injection enhancement containing bromelin are used.

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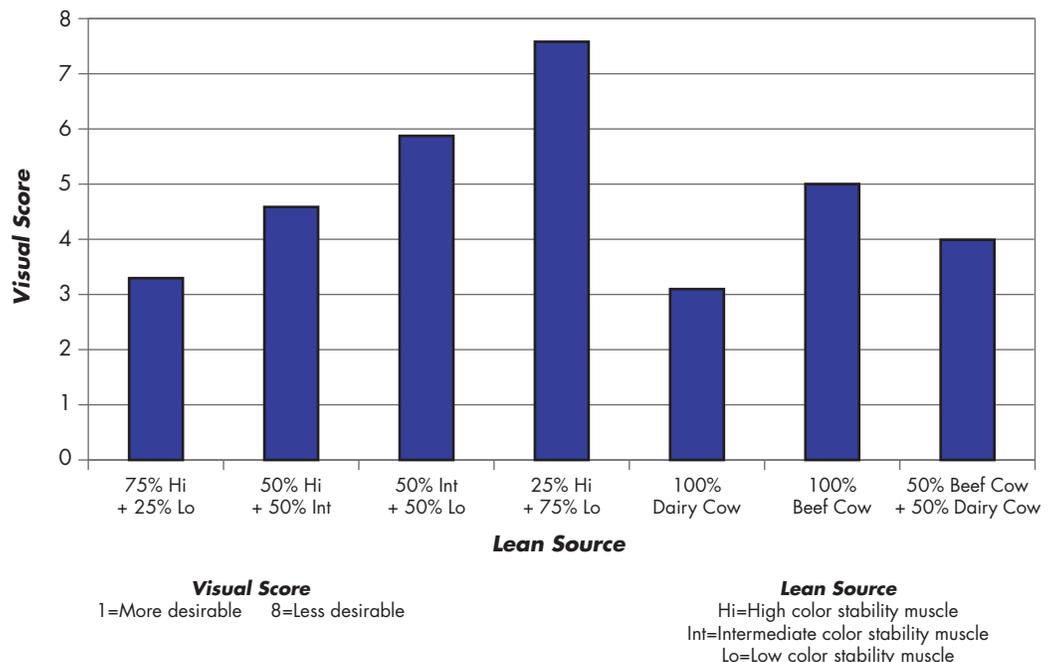
## Optimizing Ground Beef Lean Sources to Maximize Display Color Life

**Chris Raines**

**Objective:** Evaluate interactions of ground muscles of different established beef sources on display color life and determine if using beef or dairy cow meat affects color dynamics and stability of ground beef.

**Study Description:** Cow muscles pre-ranked for color stability as high (*M. longissimus thoracis*), intermediate (*M. semimembranosus*), or low (*M. triceps brachii*) were used in six ground beef formulations. Also, inside rounds from beef cows and dairy cows were combined to make three beef/dairy blends. These blends were formulated to 80% and 90% lean points using fat from either beef or cow trim. Two 0.25-lb patties were made for each blend and evaluated for visual and instrumental color.

### Visual Color of Selected 90/10 Ground Beef Blends at 3 Days of Display



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**The Bottom Line:** Use of high color stability muscles can be optimally managed to lengthen display color life of ground beef. Ground dairy cow lean is as color stable, and perhaps more stable, than ground beef cow lean providing the dairy cow lean is from reasonably color stable muscle. Application of these findings in combination with optimal cold-chain management could result in increased value of ground beef from beef and dairy cows.

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## Packaging Atmospheres Alter Beef Tenderness, Fresh Color Stability, and Internal Cooked Color

**Jeannine Grobbel**

**Objective:** Evaluate the effects of different packaging atmospheres on beef strip loin tenderness, fresh color stability, and internal cooked color.

**Study Description:** Select strip loin steaks were packaged in high-oxygen ( $\text{HiO}_2$ ) modified atmosphere packaging (MAP), ultra-low oxygen blends with carbon monoxide ( $\text{ULO}_2\text{CO}$ ) MAP, or vacuum packaging (VP). Instrumental tenderness and instrumental internal cooked color were measured, and fresh display color was scored by trained panelists. Steaks for instrumental tenderness and internal cooked color were cooked to  $158^\circ\text{F}$ , a medium degree of doneness.

### Results:

- Steaks packaged in  $\text{HiO}_2$  MAP discolored faster and to a greater extent than steaks in all other packaging treatments.
- Steaks packaged in  $\text{ULO}_2\text{CO}$  MAP had tenderness equal to or better than steaks packaged in  $\text{HiO}_2$  MAP.
- Packaging atmospheres altered internal cooked color, with steaks packaged in  $\text{HiO}_2$  MAP exhibiting premature browning.
- Strip loin steaks packaged in  $\text{HiO}_2$  MAP were less tender at the end of display than steaks in other packaging treatments, which could be a result of the shorter aging time associated with the  $\text{HiO}_2$  MAP system.

**The Bottom Line:** Packaging beef in  $\text{ULO}_2\text{CO}$  MAP provides a bright red color with extended color stability, allows for a longer aging time and increased tenderness, and results in an internal cooked color that is expected for a medium degree of doneness, all of which are beneficial to the meat industry.

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## Packaging Atmospheres and Injection Enhancement Affect Beef Tenderness and Sensory Traits

**Jeannine Grobbel**

**Objective:** Determine the effects of packaging atmosphere and injection-enhancement on tenderness, sensory traits, and desmin degradation of beef strip loins, eye of rounds, and chuck clods.

**Study Description:** Select strip loins, eye of rounds, and shoulder clods were injection-enhanced or non-enhanced and packaged in different atmospheres, including high-oxygen ( $\text{HiO}_2$ ) modified atmosphere packaging (MAP), ultra-low oxygen with carbon monoxide ( $\text{ULO}_2\text{CO}$ ) MAP, and vacuum packaging (VP). Steaks were evaluated for instrumental tenderness, trained sensory panel analysis, and desmin degradation.

### Results:

- Enhanced steaks were juicier and had more off-flavors and less perceptible connective tissue than non-enhanced steaks.
- Enhanced steaks packaged in  $\text{HiO}_2$  MAP had less beef flavor and more off-flavors than non-enhanced steaks; non-enhanced steaks packaged in  $\text{HiO}_2$  MAP were less tender and had more off-flavors than those packaged in either  $\text{ULO}_2\text{CO}$  MAP or VP.
- Sensory panelists found steaks packaged in  $\text{HiO}_2$  MAP to be less tender than steaks packaged in VP or  $\text{ULO}_2\text{CO}$  MAP on day 18 postmortem, but Warner-Bratzler shear force results from steaks on day 14 postmortem were not different.
- Packaging treatment did not affect desmin degradation, a measure of enzymatic tenderization during aging. Desmin degradation differed between strip loins and shoulder clod muscles, but these two cuts were equal in tenderness.
- Desmin degradation was similar between control and enhanced steaks, yet enhanced steaks were much more tender than control steaks.

**The Bottom Line:** Differences in desmin degradation of different beef muscles might not be related to tenderness differences across muscles. Injection enhancement is expected to improve tenderness, but not because of increased desmin degradation. Packaging steaks in  $\text{ULO}_2\text{CO}$  MAP and VP would likely result in optimum tenderness and minimal off flavors compared with  $\text{HiO}_2$  MAP, but the purplish-red color of VP steaks generally is not acceptable to consumers.

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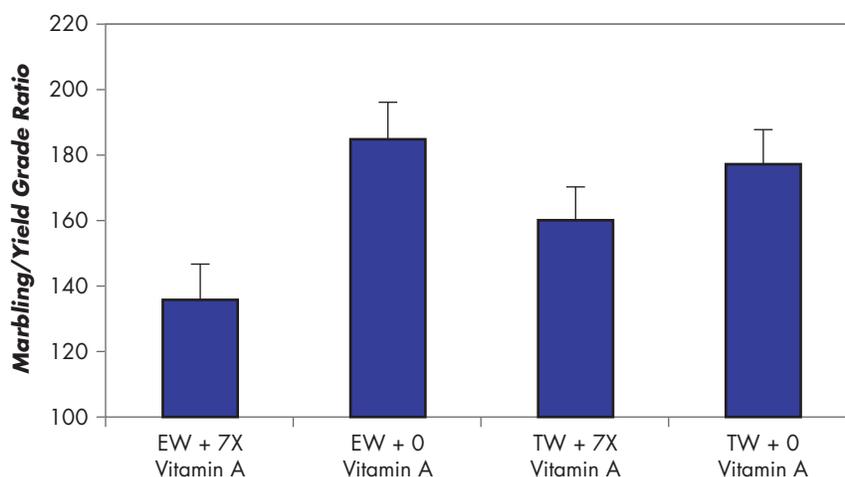


## Restricting Vitamin A in Cattle Diets Improves Beef Carcass Marbling and USDA Quality and Yield Grades

**Aaron Arnett**

**Objective:** Determine the effects of supplementing Angus cross steers, weaned at either early or traditional ages, with either zero or seven times the NRC recommended amount of dietary vitamin A on growth performance, serum and liver retinol content, and carcass quality and yield grades.

**Study Description:** Feedlot diets containing either zero or seven times the NRC recommended amount of vitamin A were fed to early-weaned ( $137 \pm 26$  days) and traditionally-weaned ( $199 \pm 26$  days) Angus cross steers for 235 and 175 days, respectively. Body weights and blood samples were collected, and ultrasound images were obtained periodically throughout the experiment. Cattle were harvested when ultrasound backfat averaged 0.40 inches. Liver, muscle, and fat samples were analyzed for vitamin A and fat content, and carcass data were collected.



EW = Early-weaned; TW = Traditionally-weaning  
0 = No vitamin A supplementation; 7X = 7 times the NRC recommended vitamin A level  
Bars indicate standard error

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**The Bottom Line:** Feeding no supplemental vitamin A to steers for up to 210 days increases carcass marbling and quality grade without increasing backfat or reducing retail yield. These advantages are enhanced when calves are early-weaned near 140 days of age.

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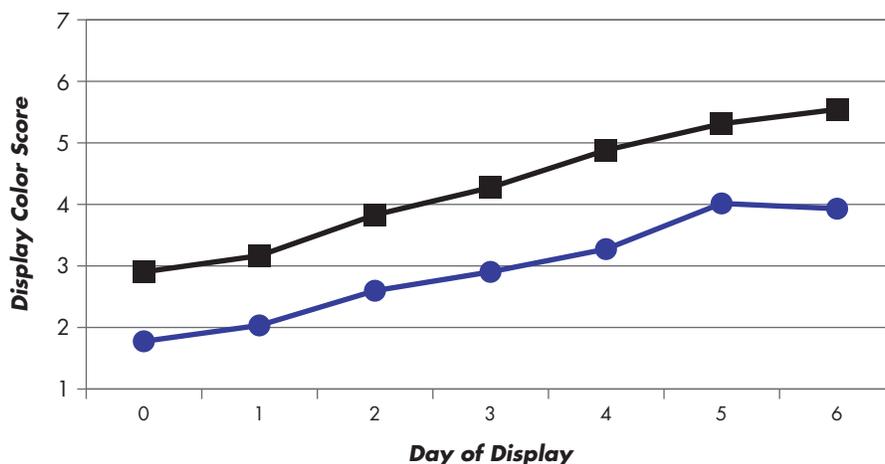
## Vitamin A Restriction During Finishing Benefits Beef Retail Color Display Life

**Melissa Daniel**

**Objective:** Determine the effects of early weaning and vitamin A restriction during finishing on beef display color, sensory attributes, and lipid oxidation of *Longissimus lumborum* and *Triceps brachii* muscles.

**Study Description:** Forty-eight Angus crossbred calves were early or traditionally weaned and placed in a feedlot on rations supplemented with 6911.6 IU/lb vitamin A or restricted to no supplemental vitamin A. *Longissimus lumborum* and *Triceps brachii* steaks were removed after 14 days of aging to evaluate retail color display, lipid oxidation, and sensory attributes.

### Display Color Scores for *Longissimus lumborum* Steaks



**Display Color Score**  
1=Most desirable 8=Least desirable

■ HA=Supplemented with 6911.6 IU/lb vitamin A  
● LA=No supplemental vitamin A

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**The Bottom Line:** Vitamin A restriction during finishing has potential to increase retail color display life and reduce lipid oxidation of beef *Longissimus lumborum* and *Triceps brachii* steaks without negatively affecting cooked meat sensory attributes.

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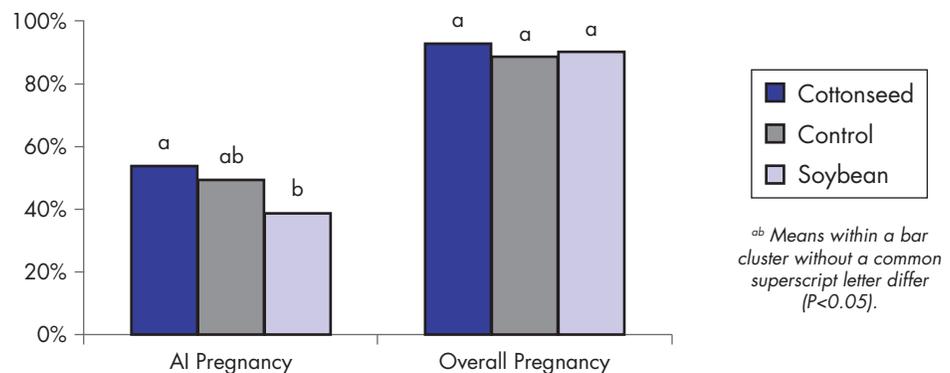
## Prepartum Supplementation Influences Response to Timed Artificial Insemination by Suckled Mature Beef Cows

**Melissa Thomas**

**Objective:** Evaluate the effects of supplementing whole fuzzy cottonseed or whole raw soybeans on response to ovulation synchronization before timed artificial insemination (AI) of mature beef cows.

**Study Description:** Cows were assigned randomly to be supplemented with whole raw soybeans, whole fuzzy cottonseed, or a 50/50 ground corn/soybean meal mixture. Supplements were hand fed for 45 days before the first projected calving date. Supplementation was continued until each cow calved; thereafter, all cows received the corn/soybean meal supplement. Ovulation was synchronized, and cows were inseminated artificially. Cows were subsequently exposed for natural service breeding for 50 more days. Conception response to timed AI and overall pregnancy were assessed.

### Effect of Treatment on Pregnancy Rate



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**The Bottom Line:** Source of prepartum supplemental fat fed to mature beef cows can affect conception response to timed AI.

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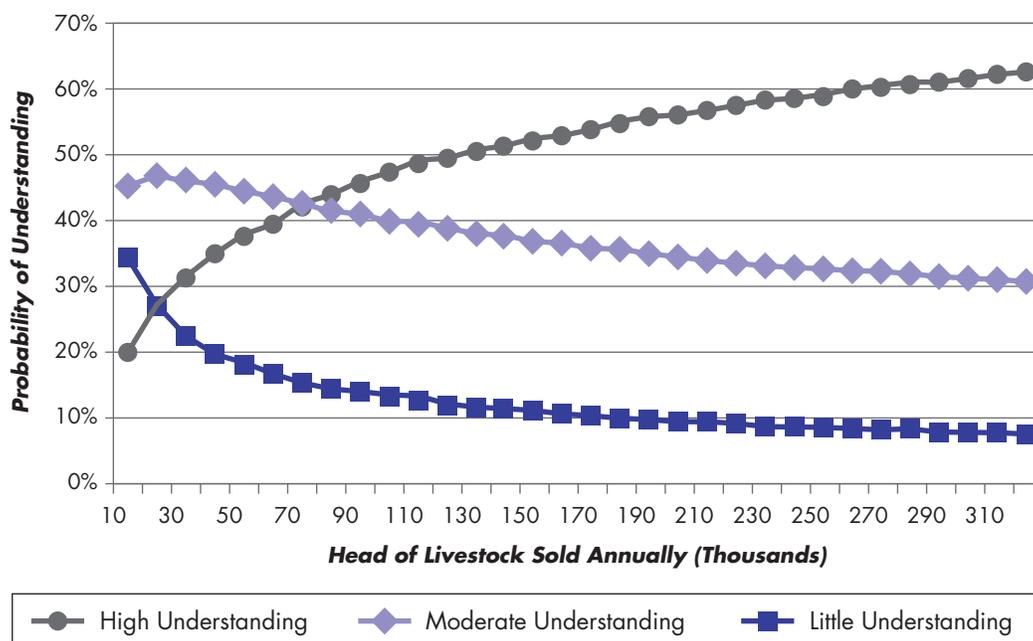
## Information Needs Regarding the National Animal Identification System in the Livestock Auction Market Industry

**Kati Bolte**

**Objective:** Identify systematic factors related to livestock market operators' knowledge, concerns, views, and adoption of the National Animal Identification System (NAIS).

**Study Description:** In a national survey of livestock markets, respondents ranked their knowledge of NAIS program standards, adoption methods, and costs; indicated concern of sale speed being adversely impacted due to NAIS adoption; revealed how they think NAIS will affect their business; and revealed whether their facility had adopted electronic animal identification systems. Results were used to determine if any systematic factors were related to responses to specific questions.

### Probability of Livestock Market Operators' Level of Understanding of How to Adopt NAIS Practices Based on Annual Livestock Sales



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**The Bottom Line:** Livestock market operators need additional and on-going information regarding NAIS standards, adoption requirements, and costs. This information will affect operators' adoption rates and views of the NAIS.

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## Costs of Adopting Radio Frequency Identification Reader Systems and Tagging Services in Livestock Auction Markets

**Kati Bolte**

**Objective:** Estimate annualized costs of adopting radio frequency identification (RFID) reader systems and tagging services at livestock auction markets and determine associated economies of size.

**Study Description:** A national survey of livestock markets asked livestock market operators 1) if they would offer a RFID tagging service if the National Animal Identification System were fully implemented and 2) if they have adopted a RFID reading system. Operators were asked to provide information about the investments and annual expenses required to offer these services. This information was used to estimate annualized costs of the systems to livestock markets.

### Estimated Annualized Cost of RFID Tagging Services and RFID Reader Systems Among Livestock Auction Markets

Service	Annualized Cost per Head		
	Average	Minimum	Maximum
RFID Tagging Service <sup>1</sup>	\$3.21	\$0.00	\$61.49
RFID Reader System <sup>2</sup>	\$0.76	\$0.14	\$4.02
RFID Reader System <sup>3</sup>	\$0.19	\$0.04	\$1.01

<sup>1</sup> Cost of tagging per head expected to use the service, excludes the cost of RFID tags

<sup>2</sup> RFID reading cost per head, assuming 25% of cattle sold annually use the system

<sup>3</sup> RFID reading cost per head, assuming 100% of cattle sold annually use the system

Economies of size exist in adoption of RFID tagging services and RFID reader systems among livestock auction markets. Costs per head decrease as livestock usage increases when adding either service, and costs per head decrease as facilities increase in cattle volume when a RFID reader system is adopted.

**The Bottom Line:** Large-volume livestock markets and those that will send a higher percentage of cattle through such a system are more likely adopters of RFID technology than small-volume markets and/or those that would not heavily utilize RFID technology.

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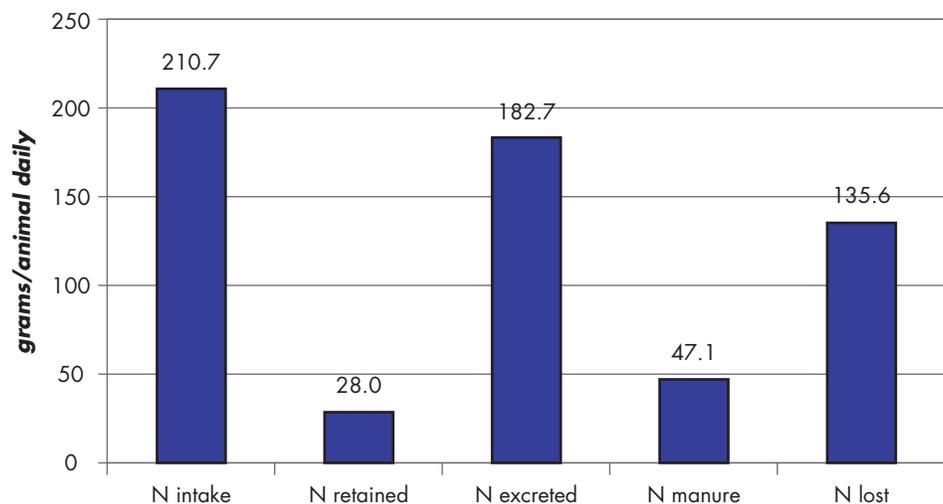
## Nutrient Balance of a Commercial Feedlot

**Joel DeRouchey**

**Objective:** Determine the nutrient balance of a commercial feedlot and measure amounts of recoverable nitrogen and phosphorus from the feedlot pen surface.

**Study Description:** A commercial feedlot with a capacity of approximately 35,000 cattle was used from November 2005 to May 2006. Data were collected from eight adjoining pens; daily logs were kept for each pen. Data included head count, ration, and amount of feed delivered. Samples of all rations were taken at the bunk for nutrient analyses. All pens were cleaned uniformly at the beginning and conclusion of the experiment with weights of removed manure recorded by pen.

### Nitrogen Balance of a Commercial Feedlot



**The Bottom Line:** Significant amounts of nutrient excretion relative to nutrient intake levels occur in feedlot cattle. This, coupled with subsequent losses of excreted nutrients from the pen surface needs to be addressed further.

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## Behavior of Beef Cows Grazing Topographically Rugged Native Range is Influenced by Mineral Delivery System

**Nancy Sproul**

**Objective:** Measure how behavior of grazing cows is influenced by a molasses-based mineral product compared with a dry, granular mineral product.

**Study Description:** The study was conducted on four pastures in the Kansas Flint Hills. Each pasture was grazed by 60 mature beef cows from February to May 2007. Treatments were self-fed mineral supplements delivered in a dry, granular form (DRY) or in a low-protein, cooked molasses-based block (BLOCK). Both DRY and BLOCK were deployed in each pasture. No additional salt was supplied.

Forage utilization in the vicinity of each supplement type and the frequency and duration of herd visits to the vicinity of each supplement were measured during four 14-day periods. Supplements were moved to new locations each period. Motion-sensitive cameras monitored the frequency and duration of herd visits to each supplement deployment site.

### Frequency, Duration, and Timing of Visits to Pasture Sites Containing Dry, Granular Mineral Supplements (DRY) or Molasses-based Mineral Supplements (BLOCK) by Grazing Cows

Item	Treatment		SEM	P-value
	DRY	BLOCK		
As-fed intake, lbs/cow/day	0.13	0.42	0.06	<0.01
Visit frequency, visits/day	2.47	2.82	0.13	0.02
Visit duration, min/day	54.9	125.7	8.4	<0.01
Visits from 6 p.m. to 6 a.m., % of total visits	50.1	56.7	3.3	0.15
Duration of night visits, min/day	52.3	67.3	7.2	0.16

**The Bottom Line:** Data suggest that block supplements influence the behavior of grazing cattle to a greater degree than dry mineral supplements. Molasses-based mineral supplements might be more effective than dry, granular mineral supplements at luring grazing cattle into underutilized areas of pasture.

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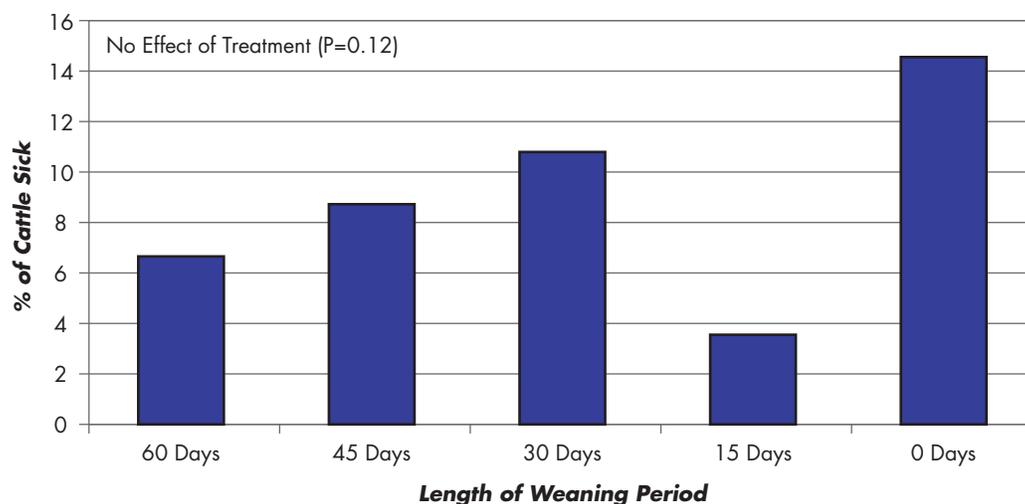
## Length of the Weaning Period Does Not Affect Post-Weaning Growth or Health of Lightweight Summer-Weaned Beef Calves

**Justin Bolte**

**Objective:** Test the validity of beef industry assumptions about the appropriate length of ranch-of-origin weaning periods for summer-weaned calves aged 100 to 160 days.

**Study Description:** Angus cross calves ( $n = 400$ ) were stratified by age and assigned to one of five weaning periods (60, 45, 30, 15, or 0 days) that corresponded to the length of time between separation from dams and shipping to an auction market. Calves were vaccinated against common diseases 14 days before separation from dams and again on the day of separation. On a common shipping date (day 0; August 24, 2007), calves were transported 3 hours to a commercial auction market and held for 14 hours. Calves were then transported 1 hour to a feedlot. All calves were fed the same diet free choice throughout the trial; they also were monitored twice daily for symptoms of respiratory disease. Body condition of dams was assessed 60 days before and 60 days after shipping.

### Effect of Weaning Period Length on Incidence of Undifferentiated Fever in Lightweight Calves during the First 30 Days after Feedlot Arrival



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**The Bottom Line:** Under the conditions of our study, ranch-of-origin weaning periods of between 15 and 60 days did not improve calf health or growth performance relative to shipping calves immediately after maternal separation.

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## Heifers Sired by Bulls with Low Residual Feed Intake Estimated Breeding Values Have Lower Residual Feed Intake Than Heifers Sired by Bulls with High Residual Feed Intake Estimated Breeding Values

**Jennifer Minick Bormann**

**Objective:** Determine differences in feed intake of progeny of bulls with divergent genetic merit for residual feed intake (RFI).

**Study Description:** Angus bulls with high and low Estimated Breeding Value (EBV) for RFI were selected from the Australian Angus Association sire summary and mated to Angus cross commercial cows. Individual feed intakes were recorded on the resulting heifer calves (n=50) for 42 days using the Calan gate feed intake measuring system. Predicted feed intake based on weight and gain was subtracted from actual intake to calculate RFI for each heifer.

The regression of heifer RFI on sire RFI EBV was 0.63 lbs of heifer RFI per lb of sire RFI EBV, which is similar to the 0.50 lbs of heifer RFI per lb of sire RFI EBV that would be expected.

### Least Square Means for RFI, Feed-to-Gain Ratio (F:G), and Average Daily Gain (ADG) of Heifers Sired by Low (LOW) or High (HIGH) RFI EBV Bulls

	RFI (lbs)	F:G (lbs:1 lb)	ADG (lbs/day)
LOW	-0.53	12.14	2.6
HIGH	0.64	12.52	2.7
P value	0.18	0.87	0.47

**The Bottom Line:** Preliminary results show that differences in daughter RFI were similar to what was predicted by the sire RFI EBV. Further work will be done to determine the correlations between RFI and other traits, such as fertility and carcass traits.

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## Distiller's Grain Market Price Relationships, Discovery, and Risk Management

**Tyler Van Winkle**

**Objective:** Evaluate price relationships to assess market efficiency and determine whether existing futures markets provide distiller's grain (DG) price risk management opportunities.

**Study Description:** We evaluated the nature of price linkages across DG market locations. The ability to offset DG price risk using corn and soybean meal (SBM) futures is incorporated into the analysis to quantify strength of price relationships because these commodities are expected to be most closely related to DG prices.

**Results:** Tests of long-run price linkages for each pair-wise DG market location and futures markets indicated 27 of 78 (35%) of all combinations have stable long-run relationships ( $P < 0.05$ ). Corn and SBM futures markets tend to lead various DG market prices with little feedback, implying that when corn and SBM futures prices change, DG market prices tend to follow. However, DG market prices do not cause noticeable changes in corn or SBM prices.

Speed of price adjustment was estimated to determine how quickly DG markets respond to price changes at other locations. Most speed-of-adjustment coefficient estimates are statistically significant ( $P < 0.05$ ). However, estimates range from 0.028 to 0.216, suggesting overall reaction time across spatial markets is slow. Opportunity for cross hedging DG using corn and SBM futures varied noticeably by location. Magnitude of hedge ratios is location dependent, but the models do a poor job of explaining price variability in the cash DG market. Using a combination of the two futures contracts does not appear to enhance the ability to explain price variability in the DG market; therefore, cross hedging DG via corn and SBM futures contracts does not appear viable.

**The Bottom Line:** Relationships of DG prices at different locations are not strongly linked, meaning these markets tend to operate independently. Comparing prices for DG across different markets might provide opportunities for market participants looking for the best price. Existing corn and SBM futures markets are not viable cross hedges for DG, which motivates use of forward contracting or development of a DG futures market to help manage DG price risk over time.

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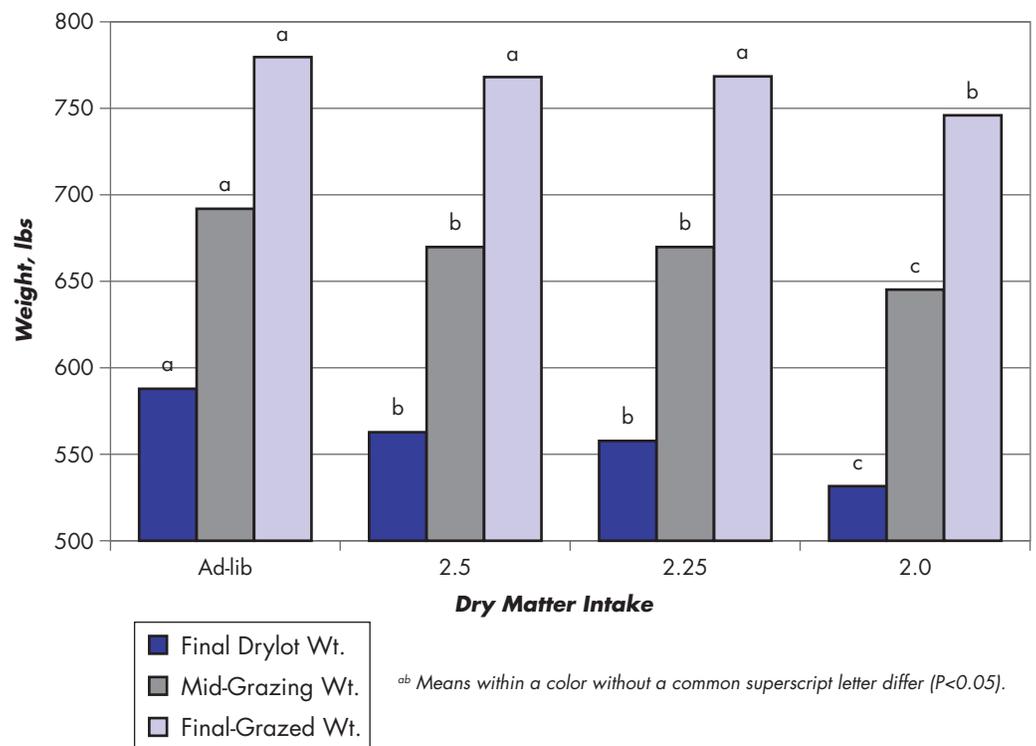
## Restricted Feeding Improves Performance of Growing Steers During Subsequent Grazing on Native Flint Hills Pasture

**Chad Anglin**

**Objective:** Determine if compensatory gain occurs during intensive early stocked grazing following periods of dietary restriction.

**Study Description:** Steers were fed at dry matter intakes of free choice or 2.00, 2.25, or 2.50% of body weight for 45 days in a drylot. Intakes were adjusted according to body weight every 14 days. Steers were sorted by weight and treatment and placed on pasture May 1, 2007. Steers were removed from pasture July 28, 2007.

### Final Drylot and Grazing Weights



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**The Bottom Line:** Restricting steers' dry matter intake to 2.50% or 2.25% of body weight in a drylot will allow steers to compensate in terms of weight gain during early intensive grazing. Limit-feeding can also reduce total production costs.

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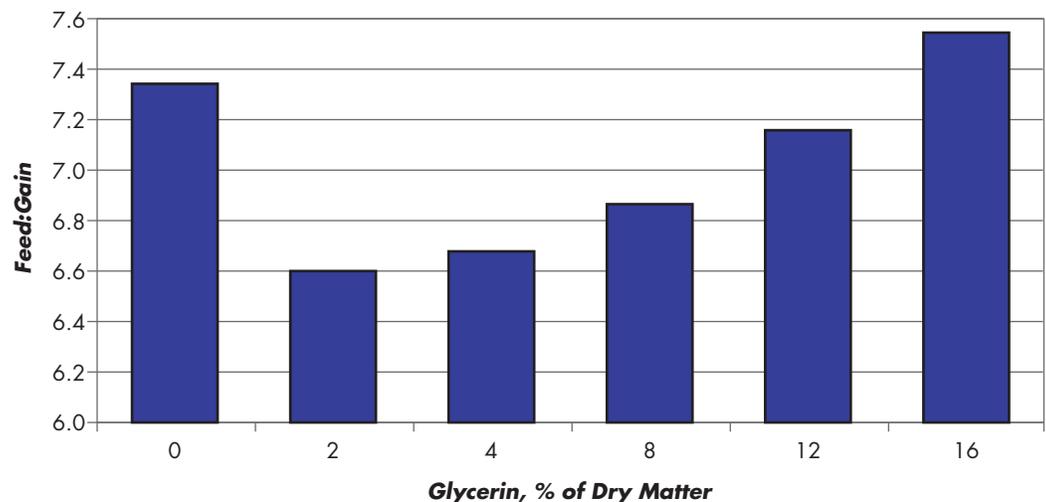
## Crude Glycerin Increases Performance in Finishing Cattle

**Garrett Parsons**

**Objective:** Determine the effects of feeding crude glycerin derived from soybean oil to finishing beef cattle.

**Study Description:** Crossbred yearling heifers ( $n = 375$ ;  $929.5 \pm 63$  lbs) were fed finishing diets containing 0, 2, 4, 8, 12, or 16% crude glycerin (dry matter basis). Cattle were blocked by initial weight and assigned to one of the six diets with six to seven animals per pen and nine pens per diet. Cattle were housed in 54 concrete-surfaced pens ( $392.9 \text{ ft}^2$ ) with roofs covering feed bunks and half the pen. Diets consisted of steam-flaked corn with 6% alfalfa hay and 1.2% urea and provided 300 mg monensin, 90 mg tylosin, and 0.5 mg melengestrol acetate per animal daily. Cattle were transitioned from the control diet (no glycerin) to diets containing increasing proportions of glycerin over a period of 10 days. Cattle had free choice access to feed, and diets were delivered once daily throughout the 85-day trial.

### Effect of Dietary Glycerin on Feed:Gain



**The Bottom Line:** Adding glycerin to cattle finishing diets improved weight gain and efficiency, particularly when added at levels of 8% or less of the diet dry matter.

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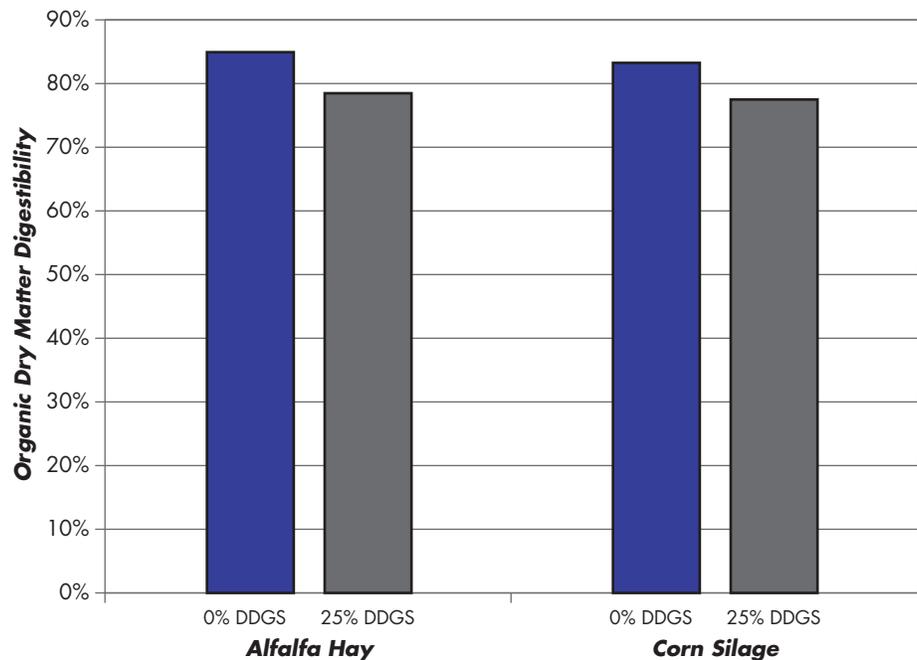
## Substituting Steam-Flaked Corn with Dried Distiller's Grains Alters Ruminal Fermentation and Diet Digestibility

**Solange Uwituze**

**Objective:** Examine ruminal fermentation characteristics and diet digestibility when steam-flaked corn-based finishing diets were supplemented with 0 or 25% dried distiller's grains with solubles (DDGS), using alfalfa hay or corn silage as roughage sources.

**Study Description:** Cannulated Holstein steers ( $n = 12$ ) were fed steam-flaked corn-based finishing diets with 0 or 25% DDGS (dry matter basis), using alfalfa hay or corn silage as roughage sources. The study was conducted in two periods, each consisting of a 17-day adaptation phase and 3-day collection phase. Three animals were assigned to each treatment in each period. Ruminal digesta samples were collected at 2-hour intervals after feeding during the collection phase and were used to evaluate changes in ruminal fermentation. Fecal samples were used to determine digestibility of the diets.

### Digestion of Organic Matter



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**The Bottom Line:** Feeding DDGS at moderate levels in steam-flaked corn-based diets might require additional degradable intake protein supplementation to ensure adequate available nitrogen for bacterial growth and subsequent digestion of dietary organic matter.

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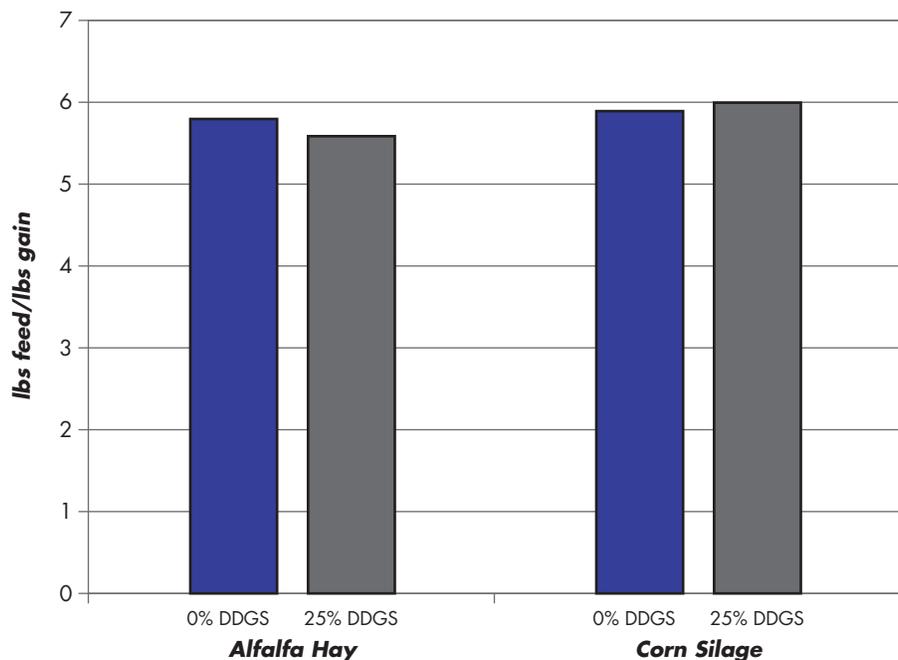
## Evaluation of Dried Distiller's Grains and Roughage Source in Steam-Flaked Corn-Based Finishing Diets

**Solange Uwituze**

**Objective:** Evaluate dried distiller's grains with solubles (DDGS) as a partial replacement for steam-flaked corn when corn silage or alfalfa hay are used as roughage sources.

**Study Description:** Crossbred yearling heifers (n = 358) were used in a 97-day finishing study. Heifers were fed steam-flaked corn-based finishing diets with 0 or 25% (dry matter basis) corn DDGS. Additionally, diets included either 10% corn silage or 6% alfalfa hay. Heifers were housed in dirt-surfaced pens (2640 ft<sup>2</sup>) and received Revalor-200 implant, Bovishield-IV, Fortress-7, and Phoenectin pour-on.

### Feed:Gain



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**The Bottom Line:** Heifers fed 25% DDGS as partial replacement of steam-flaked corn had similar growth performance and carcass quality as heifers fed no DDGS. Corn silage and alfalfa hay were comparable roughages when a portion of steam-flaked corn was replaced with DDGS.

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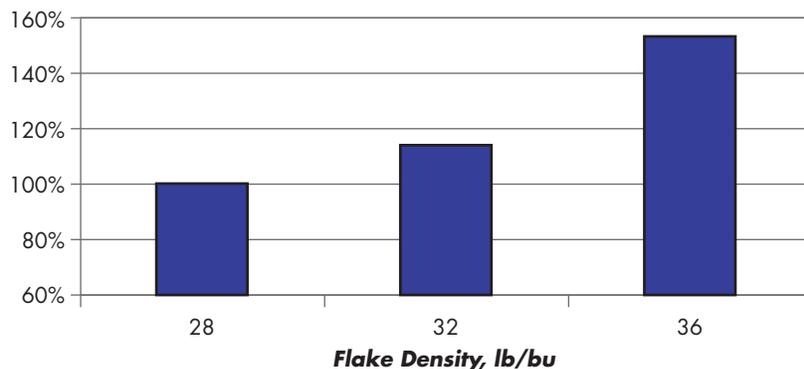
## Increasing Flake Density Yields No Economic Advantage

**Matt May**

**Objective:** Determine the optimum density of steam-flaked corn for finishing heifers.

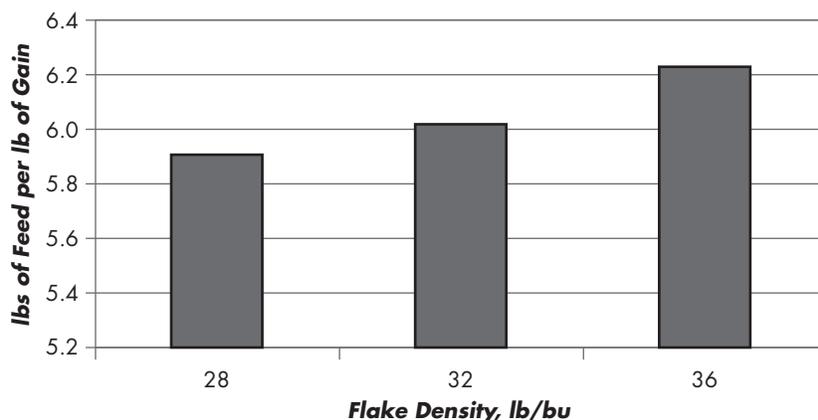
**Study Description:** The study used 358 heifers that were fed corn-based diets with corn flaked to densities of 28, 32, or 36 lb/bushel. Feedlot performance and carcass characteristics, as well as mill efficiency, were measured.

### Relative Throughput of the Flaker Mill



Means are expressed as a percentage of throughput for the 28-lb flaked corn.

### Feed Conversion of Heifers Fed Corn Flaked to Densities of 28, 32, or 36 lb/bushel



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**The Bottom Line:** Mill production can be increased by flaking to higher density, but decreases in animal performance and loss of carcass weight outweigh the economic benefit of flaking corn to densities greater than 28 lb/bushel.

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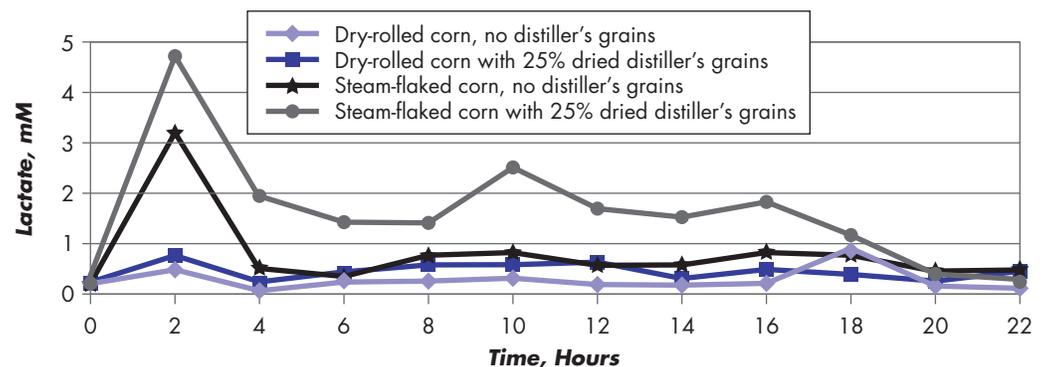
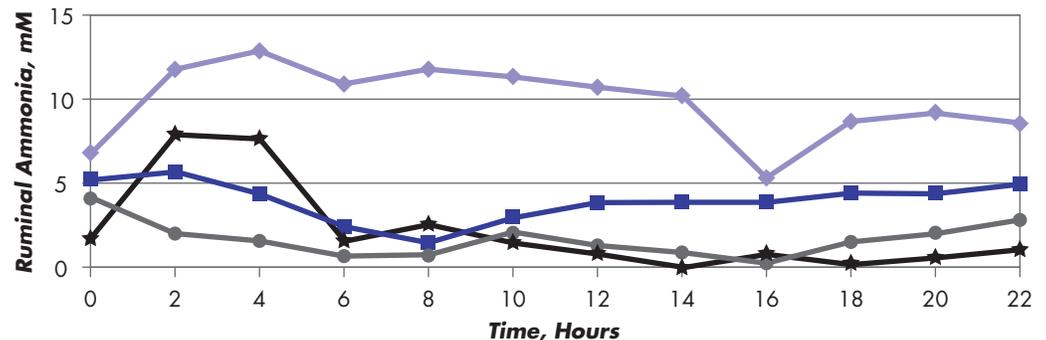
## Distiller's Grains Increase Ruminal Lactate and Decrease Ruminal Ammonia Concentration

**Matt May**

**Objective:** Evaluate digestibility characteristics in cattle fed dry-rolled corn or steam-flaked corn diets with 0 or 25% dried distiller's grains.

**Study Description:** Our study used 16 ruminally cannulated steers fed dry-rolled or steam-flaked corn and 0 or 25% dried distiller's grains with solubles. Ruminal volatile fatty acid production, lactate, ammonia, and pH were analyzed. Additionally, digestibilities of dry matter, organic matter, neutral detergent fiber, starch, and fat were measured.

### Ruminal Ammonia and Lactate Concentrations of Cannulated Steers Fed Steam-Flaked Corn or Dry-Rolled Corn Finishing Diets Containing 0 or 25% Dried Distiller's Grains with Solubles



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**The Bottom Line:** Fed in conjunction with steam-flaked corn, dried distiller's grains increased ruminal lactate, decreased ruminal ammonia, and decreased ruminal pH at critical times during digestion. This could contribute to decreased animal performance in cattle fed combinations of flaked grain and distiller's grains.

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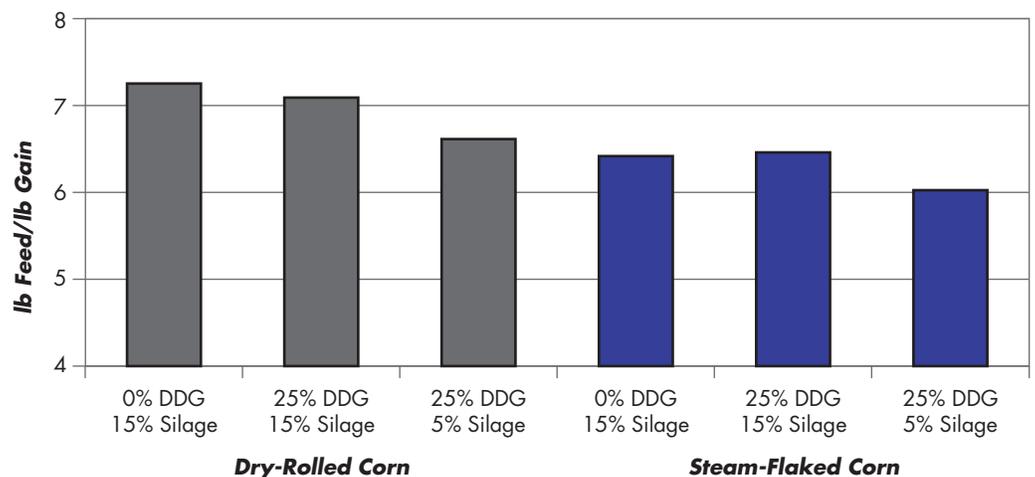
## Lower Roughage Levels Improve Feed Conversion

**Matt May**

**Objective:** Determine if the proportion of roughage could be reduced in finishing diets that contain dried distiller's grains, and measure performance of feedlot heifers fed diets in which a portion of the steam-flaked or dry-rolled corn was replaced by dried distiller's grains.

**Study Description:** Crossbred yearling heifers (n = 582) were fed finishing diets for 110 days. Treatments were 0% dried distiller's grains with 15% corn silage, 25% dried distiller's grains with 15% corn silage, or 25% dried distiller's grains and 5% corn silage, using either steam-flaked corn or dry-rolled corn as grain source. Feedlot performance and carcass characteristics were measured on all animals.

### Feed Conversion for Heifers Fed Steam-Flaked or Dry-Rolled Corn with Dried Distiller's Grain (DDG) and Reduced Roughage



**The Bottom Line:** Cattle performance can be improved by reducing roughage levels in finishing diets that contain dried distiller's grains.

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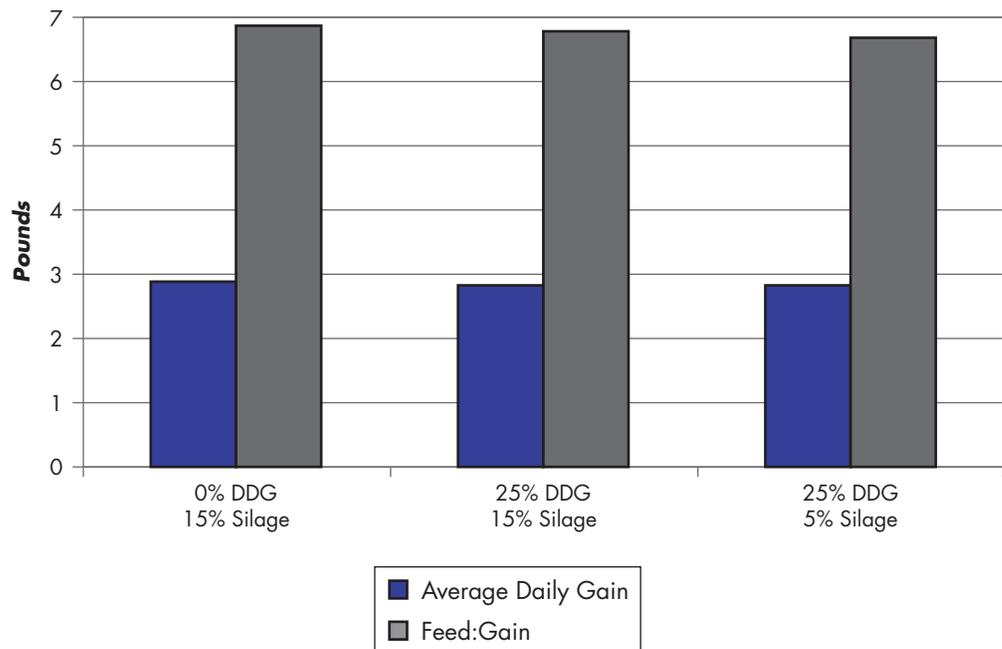
## Reduced Roughage Does Not Decrease Performance

**Matt May**

**Objective:** Determine if roughage level could be reduced in steam-flaked corn-based finishing diets when dried distiller's grains are fed.

**Study Description:** Crossbred yearling heifers (n = 384) were fed flaked corn finishing diets for 85 days. Treatments consisted of the following diets (dry matter basis): 0% dried distiller's grains with 15% corn silage; 25% dried distiller's grains with 15% corn silage; or 25% dried distiller's grains and 5% corn silage. Feedlot performance and carcass characteristics were measured.

### Average Daily Gain and Feed Conversion for Heifers Fed Steam-Flaked Corn-Based Finishing Diets with Dried Distiller's Grain (DDG) and Reduced Roughage Levels



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**The Bottom Line:** Dried distiller's grains can replace a portion of the grain in a diet without decreasing animal performance.

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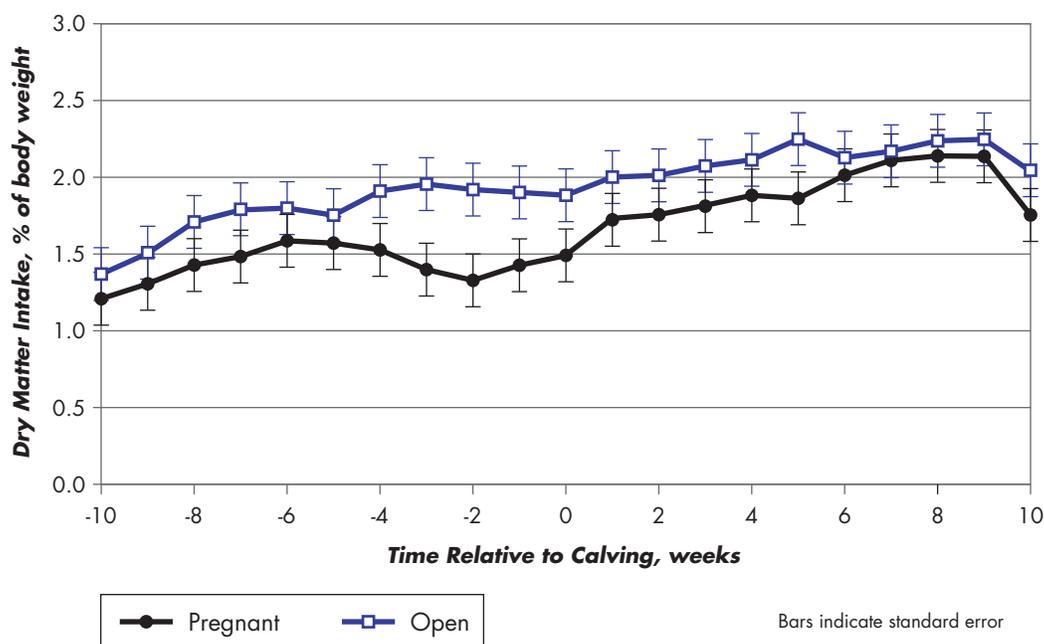
## Forage Intake by Pregnant and Lactating First-Calf Heifers

**Dan Linden**

**Objective:** Measure the effects of advancing gestation and lactation on forage intake by first-calf heifers.

**Study Description:** Commercial Angus heifers were individually fed chopped, warm-season grass hay from 10 weeks prepartum to 10 weeks postpartum. Hay was fed to heifers free-choice; amounts of hay fed and refused were recorded daily. Treatments were based on pregnancy status. Six heifers began the study pregnant (average initial day of gestation = 213). After calving, they were milked by machine twice daily to approximate milk consumption by a nursing calf. The remaining five heifers served as non-pregnant, non-lactating controls.

### Dry Matter Intake by Pregnant or Lactating Heifers vs. Non-Pregnant, Non-Lactating Heifers



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**The Bottom Line:** Increase in dry matter intake characteristic of mature beef cows in early lactation may be absent in first-calf beef heifers. Absence of a vigorous intake response during the post-calving/pre-breeding period could be a causal factor in reproductive failure by first-calf heifers.

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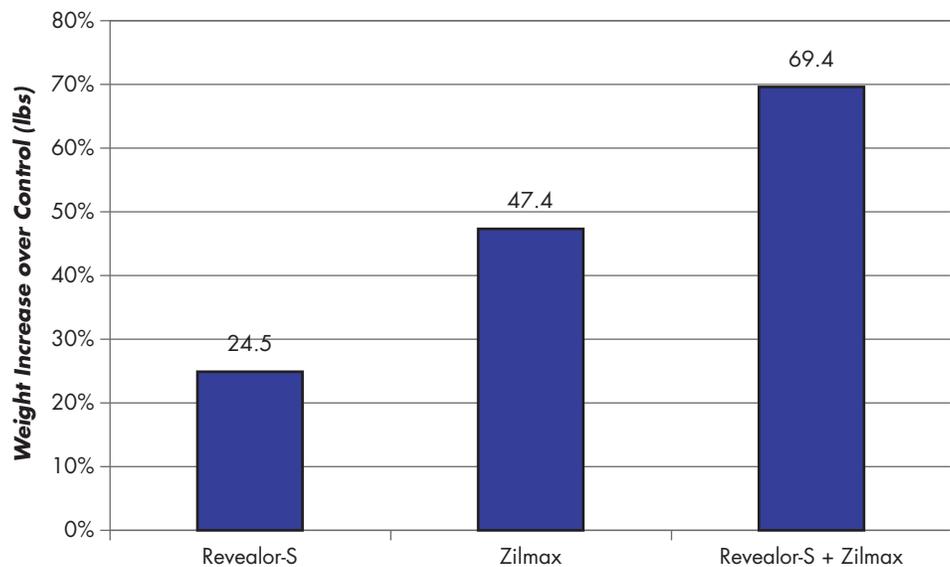
## Zimax Improves Performance of Implanted and Non-Implanted Finishing Steers

**Timothy Baxa**

**Objective:** Evaluate performance of finishing steers administered Zimax during the last 30 days on feed with and without steroidal implants and determine if there is an additive effect with combined use of Zimax and steroidal implants.

**Study Description:** Crossbred steers (n = 2279) weighing 940 lb were used in a 91-day finishing study to compare performance and carcass traits with and without administration of Revalor-S and Zimax, a beta-adrenergic agonist. Steers received a Revalor-S implant or no implant with and without Zimax for the last 30 days on feed followed by a 3-day withdrawal. Performance was measured as average daily gain, feed:gain ratio, hot carcass weight, dressing percentage, subcutaneous fat, ribeye area, and marbling.

### Hot Carcass Weight of Steers



**The Bottom Line:** Zimax improves performance of steers administered steroidal implants. Zimax and steroidal implants additively stimulate lean growth by steers during the last 30 days on feed.

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# **BEEF CATTLE RESEARCH 2008 – SUMMARY PUBLICATION**

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