

News from KSU Animal Sciences

October, 2009



Newsletter from the Department of Animal Sciences and Industry
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WHAT'S NEW....

☞ **Management Minute** – Chris Reinhardt, Ph.D., Extension Feedlot Specialist *“A Culture of Safety”*

Last month we discussed starting the training process of the new hire. Obviously that process will be dominated by day-to-day duties, responsibilities, specialized practices and the like. But we can't lose sight of the fact that this is a critical first step in building a corporate culture. I hesitate to use the word “corporate” because of its implications of a disconnected, disembodied, sterile entity, but in reality, the word simply means “pertaining to a body.” You are training on the culture of your workplace community.

There are many facets of the culture which you can impart: integrity, quality, commitment to the customer, just to name a few. But in our agricultural work places, none is more important to the person in the workplace than that of *Safety*.

Without a pervasive culture of safety, safe practices (safety glasses, hard hats, helmets for ATV use, etc.) are perceived by everyone as simply a way for the “corporation” (in the business sense, not the community sense) to placate their insurance provider. Because these practices are not taken seriously by all parties, accidents continue to occur, and lives and livelihoods continue to be placed in jeopardy.

Conversely, sending the clear message of the *Culture of Safety* means that you, the employee, matter; your safety matters; your colleague's safety matters; they matter more than saving a few seconds, minutes, or hours of production time. Safety comes first, before speed or short-term targets of productivity because a safe organization will have greater *long-term* productivity.

Train on safety first, before training on the proper procedure for expense reimbursement submission or vacation policy, or whatever, and keep on training---never stop training---and the *Culture of Safety* will become embedded throughout your workplace team.

For more information, contact Chris at 785-532-1672 or cdr3@ksu.edu.

☞ **Higher Ruminant pH Increases In Vitro Digestion of Diets Containing Distillers Grains** - We conducted an in vitro study to investigate effects of three pH levels (5.0, 5.5, or 6.0) on fermentative activity of ruminal contents from cattle adapted to a finishing diet containing 25% (dry-matter basis) dried distillers grains with solubles at three incubation times (6, 12, and 24 hours). A 50:50 mixture of distillers grains and dry-rolled corn was fed to the test tube cultures. We attained our targeted pH levels by using citric acid or phosphoric acid. We measured concentrations of volatile fatty acids and disappearance of dry matter. The objective of this experiment was to determine the effects of pH on in vitro fermentative activity of ruminal contents from cattle adapted to a finishing diet containing 25% distillers grains (dry-matter basis)..

Bottom Line.... Feeding strategies aimed at increasing ruminal pH may be a logical approach for improving digestion of distillers grains in flaked-grain finishing diets. View the complete research report at www.asi.ksu.edu/cattlemensday. For more information, contact Jim Drouillard (785-532-1204; jdrouill@ksu.edu) or Chris Reinhardt (785-532-1672; cdr3@ksu.edu).

☞ **2009 KSU Beef Stocker Field Day Proceedings available online** – Topics for this year's KSU Beef Stocker Field Day included Buying and Selling Right, Thinking Outside the Shots, Cattle Financing in a Tight Credit market, and much more. A copy of the proceedings is available at www.KSUbeef.org. Printed copies are available for \$10.00 each. If you are interested in receiving the printed version, contact Lois Schreiner (785-532-1267; lschrein@ksu.edu).

↳ **Feedlot Facts** by Chris Reinhardt, Ph.D., Extension Feedlot Specialist

“Calf Growing Rations”

After weaning and deciding to hold the calf on the ranch for a few months prior to selling, finishing out at home, or shipping to the feedlot, you'll need to determine what your goals are for the growing phase. This decision should be driven by the markets (fed cattle, feeder cattle, and corn), the weather, your facilities, and available feed supplies. These factors will determine how long you decide to feed the calves, and at what rate of gain.

Assuming that you have an abundant supply of low-cost forage available, the question of desired rate of gain will drive your decision of how much grain and/or grain byproducts to incorporate. Generally, for growing or forage-based diets, we can assume grain byproducts to have nearly equivalent energy value to cracked corn, although some have more value than others. Typically it can be said that distillers grains (wet or dry) have about 105% the energy value of corn, corn gluten feed about 95%, soyhulls about 80%, wheat midds about 75%, and should be priced accordingly. These numbers will vary depending on the feeding situation and ingredients making up the rest of the diet. If silage is used, a higher inclusion rate of dry byproducts can be considered; if only dry forage is used, wet byproducts are an attractive alternative.

If you are feeding corn or sorghum silage and your goal is for the calves to gain about 1.80-2 lb per day, you will need a ratio of 50:50 forage:grain (as-fed basis); if your goal is 2.5 lb per day, you'll need roughly a 65:35 ratio. Using a blend of alfalfa/grass hays, you'll need a forage:grain ratio of 70:30 to achieve 1.80-2 lb ADG and a 50:50 ratio for 2.5 lb ADG. Distillers grains or corn gluten feed can help balance protein needs; otherwise you'll need an additional protein source such as soybean meal, cottonseed meal, or a commercial protein supplement. You may also need to balance for additional Calcium, vitamins, and trace minerals. If you do not have excellent mixing equipment you should consider purchasing and blending a commercial base mix or supplement to ensure that all cattle receive a balanced diet and performance is optimized; this is also an excellent way to provide an ionophore.

For more information, contact Chris Reinhardt at cdr3@ksu.edu or 785-532-1672.

↳ **Needle-Free Injection Enhancement of Beef Improves Tenderness but Slightly Increases**

Microbial Translocation - Five longissimus muscles from USDA Select carcasses were used in preliminary research to determine an optimal air pressure of 25 psi for needle-free injection. An additional 15 strip loins were inoculated with generic *E. coli* at a target level of 10^{5-6} CFU/cm². After 1 hour of microbial attachment, matching halves were allocated to needle-free or needle injection with a phosphate and salt solution. Immediately after injection, two cores were taken aseptically from each half and cross-sectional slices were taken at the inoculated surface and at depths of 0.4, 1.2, and 2 in. to determine translocation of generic *E. coli*. Two steaks were displayed 5 days for retail color life evaluation, and a third steak was cooked for slice shear force determination. The objective of this experiment was to compare the effects of needle-free injection and traditional needle injection on microbial translocation of generic *Escherichia coli* into subsurfaces of beef strip loins and determine effects on tenderness and color.

Samples taken from the surface of needle-injected muscles had lower ($P < 0.05$) microbial counts than needle-free injected muscles (2.79 vs. 3.23 log CFU/g, respectively). Also, the 1.2- and 2.0-in. depth samples from needle injection had the least ($P < 0.05$) microbial contamination (1.69 and 2.12 log CFU/g, respectively). Traditional needle injection resulted in approximately 0.5 log CFU/g less microbial contamination at all depths. Both treatments resulted in acceptable tenderness; however, needle-free injection improved ($P < 0.05$) tenderness more than needle injection. Needle injection posed fewer microbial risks but resulted in less tender steaks compared with needle-free injection.

Bottom Line.... Needle-free injection enhancement might be expected to slightly increase microbial translocation into the muscle interior by as much as 0.5 log₁₀ CFU/g compared with needle injection but improve tenderness compared with needle controls and have no effect on color display life. View the complete research report at www.asi.ksu.edu/cattlemensday. For more information, contact Michael Dikeman (785-532-1225; mdikeman@ksu.edu) or Liz Boyle (785-532-1247; lboyle@ksu.edu).

↳ **Effects of 200 ppb Added Chromium from Chromium Propionate on the Growth Performance and Carcass Characteristics of Finishing Pigs** – A total of 1,207 pigs (PIC 337 × 1050) were used in a 103-d experiment in a commercial research barn to evaluate the growth performance and carcass characteristics of finishing pigs fed 200 ppb chromium propionate. There were 22 replicate pens per treatment with 25 to 28 pigs per pen for the evaluation of chromium propionate from d 0 to 84 and 11 replicates per treatment for evaluating chromium propionate (0 and 200 ppb) and Paylean (0 and 9 g/ton) in a split-plot arrangement from d 84 to 103. Pigs were weighed (avg. 67.7 lb) and randomly allotted to 2 corn-soybean meal-based dietary treatments, a control diet and the control diet with 200 ppb chromium from chromium propionate. The treatments were fed through three 4-wk dietary phases (d 0 to 28, d 28 to 56, and d 56 to 84). On d 84, pigs fed the control or chromium treatment were allotted to a fourth dietary phase containing either 0 or 9 g/ton Paylean, resulting in a split-plot design. For the overall period (d 0 to 84), growth performance of pigs fed the control or 200 ppb chromium propionate was not different. From d 84 to 103 and overall (d 0 to 103), pigs fed diets containing Paylean had increased ADG and final weight. However, a chromium propionate × Paylean interaction was observed for ADFI and F/G from d 84 to 103 and overall (d 0 to 103) F/G. The reason for the interaction was that the magnitude of response to Paylean was slightly greater in pigs fed the control than in pigs fed chromium. Regardless, the F/G of pigs fed Paylean was considerably better from d 84 to 103 (2.43 vs. 2.89) and overall (d 0 to 103, 2.50 vs. 2.56) than that of those not fed Paylean. Carcass data from 500 of the pigs were available for comparison of carcass characteristics. Pigs fed Paylean had greater plant live weight than pigs not fed Paylean. Chromium propionate did not influence any of the carcass characteristics measured. This experiment provides further evidence that Paylean improves late-finishing growth performance. In this trial, growing and finishing pigs did not respond to the dietary inclusion of chromium from chromium propionate. More information is available on this experiment and others in the KSU Swine Day Report at www.KSUswine.org. (This study conducted by J.R. Bergstrom, M.D. Tokach, S.S. Dritz, J.L. Nelssen, J.M. DeRouchey, and R.D. Goodband.)

↳ **Use of Dried Distillers Grains with Solubles and Soybean Hulls in Nursery Pig Diets** – A total of 3,186 pigs were used in two 21-d experiments to evaluate growth performance of nursery pigs fed different levels of dried distillers grains with soluble (DDGS) or soybean hulls. In each experiment, pigs (n = 1,593, and 24.0 lb in Exp. 1 and n = 1,593, and 27.3 lb in Exp. 2) were allotted to 72 pens (36 pens of barrows and 36 pens of gilts) with 21 or 22 pigs per pen on d 21 after weaning. A pen of barrows and pen of gilts shared a common feeder; thus, feeder was the experimental unit. In Exp. 1, treatments were a corn-soybean meal-based control diet or the same diet with 7.5, 15, or 22.5% added DDGS. Increasing DDGS from 0 to 22.5% did not affect ADG or ADFI but linearly improved F/G. The survival rate of pigs (99.0 to 99.5%) was not affected by diet. In Exp. 2, treatments were arranged as a 2 × 2 factorial with either 0 or 15% DDGS and 0 or 4% soybean hulls. Adding DDGS, soybean hulls, or the combination of DDGS and soybean hulls to the control diet did not affect ADG. There was an interaction between DDGS and soybean hulls for ADFI and a trend for an interaction for F/G. Adding DDGS reduced ADFI and improved F/G to a greater extent when added to the control diet than when added to the diet containing soybean hulls. Adding soybean hulls to the control diet did not affect pig performance. The survival rate of pigs (99.5 to 100%) was not affected by treatments. In summary, 15 to 22.5% DDGS and up to 4% soybean hulls were added to diets for 25- to 50-lb pigs without affecting ADG; increasing levels of DDGS (up to 22.5%) improved feed efficiency in these experiments. More information is available on this experiment and others in the KSU Swine Day Report at www.KSUswine.org. (This study conducted by F. F. Barbosa, S.S. Dritz, M.D. Tokach, J.M. DeRouchey, R.D. Goodband, and J.L. Nelssen.)

↳ **Fall Manure Application** - Many livestock producers will be applying manure to harvested fields in the upcoming months. Producers need to accurately apply manure to obtain the yield benefits for next year's crop as well as capturing economic savings. Calibration of equipment must be completed for accurate application, as well as knowing the soil nutrient levels to avoid over application, particularly for phosphorus. The utilization of manure as an on-farm resource has numerous benefits, but must be done accurately to ensure economic and environmental sustainability. For more information, contact Joel DeRouchey (jderouch@ksu.edu; 785-532-2280)

↳ **Renovating CRP for Grazing or Haying** - As CRP contracts expire, some landowners are considering what needs to be done to transition the acres into a productive grazing or haying enterprise. If no removal of plant material has occurred for five or more years, plants have a limited root system and low vigor. Tall grasses produce large amounts of standing dead material and shade young plants that try to grow. Many stands are thin with large areas of bare ground between plants.

Increasing plant density and vigor is the first step to improving the stand for use as pasture or hay. Spring burning is an effective method of removing the standing dead material and mulch to allow sunlight to reach the crown of the plant. If allowed to remain, previous years forage growth will dilute the diet of grazing animals and suppress growth of young plants. Burning will also help control undesirable plants such as the eastern redcedar. Your local county extension office has materials about controlled burning and can help you find burn contractors or burn schools in your area.

Mowing or haying in March or April is another method to remove litter, although hay removed at this point would be relatively low in protein and energy. A three year study compared spring burning or spring mowing in year one to non- treated CRP. Stocker performance increased 6% to 38% after spring burning compared to no treatment. Average daily gain for stockers on the mowed plots was 2% to 5% more than controls.

Since burning and mowing won't fit all situations other options should be considered. CRP acres could be used as a calving pasture and would provide plenty of bedding and clean ground. Lactating cows would need supplementation to meet both protein and energy needs.

Extreme grazing, known as "flogging" in the graziers glossary, has a goal of leaving little residual forage. It is achieved by using a very heavy stocking for a short period of time (80 - 100 cows per acre for one to seven days). This results in trampling the dead litter into the soil and opening up new areas for seedlings and tillers. Temporary electric fencing is often needed to concentrate animals in a smaller area and then allow movement to the next section. If grazed as early as allowed in the fall, nutrient content will be relatively higher, reducing supplement needs.

Other limiting factors in CRP productivity are undesirable weeds and brush.

These problems may be best addressed while still under contract since herbicide options are broader for CRP than for use for hay or grazing.

Just like anything that hasn't been used for awhile, CRP grass stands need some type of rejuvenation to make them more productive. Individual pasture conditions will help determine if burning, mowing or grazing is the best technique to employ.

For more detailed information, see the recording of a webinar on converting CRP to pasture or crop land online at <http://www.heartlandwq.iastate.edu/Bioenergy/WEbcasts/Archives/SEpt+15.htm> (Sandy Johnson – 785-462-6281; sandyj@ksu.edu)

↳ **IRM Redbooks for Sale** – It is not too late to purchase your 2010 IRM Redbooks! The price of the redbooks will be: For orders of less than 10 = \$5.00/book; Orders of 10 or more = \$4.75/book which includes postage. To order your supply of redbooks, please contact Lois (lschrein@ksu.edu; 785-532-1267).

↳ **Influence of Glycerol and Added Fat on Finishing Pig Performance** – A 28-d study was conducted to determine the influence of dietary glycerol on grow-finish pig performance. The experiment was conducted at a commercial swine research facility in southwest Minnesota. A total of 1,093 pigs (initially 171.3 lb, PIC) were blocked by weight and randomly allotted to 1 of 6 dietary treatments. Pigs were fed corn-soybean meal-based diets. The treatments were arranged in a 2 × 3 factorial with main effects of glycerol (0, 2.5, or 5%) and added fat (0 or 6%). Overall (d 0 to 28), there was a fat × glycerol interaction ($P < 0.04$) for ADFI. When 5% glycerol was added to diets without added fat, ADFI decreased; however, ADFI did not change when glycerol was added to diets containing 6% added fat. Pigs fed diets with added fat had improved ADG and F/G compared with pigs fed diets with no added fat. Increasing glycerol decreased ADG (linear) and ADFI (linear) and tended (linear) to worsen F/G, a result of the negative effect of adding glycerol to diets without fat. In conclusion, 6% added fat improved ADG and F/G, but the glycerol used in this study decreased ADG and ADFI when added to diets without added fat. More information is available on this experiment and others in the KSU Swine Day Report at www.KSUswine.org. (This study conducted by A.W. Duttlinger, M.D. Tokach, S.S. Dritz, J.L. Nelssen, R.D. Goodband, and J.M. DeRouchey.)

UPCOMING EVENTS...

- ↪ The **2009 K-State Research and Extension Annual Conference** will be held October 20-22, 2009 at the K-State Student Union. The theme for this year's conference is "Live Well, Work Well: Securing the Future." For more information on the conference, visit www.ksre.ksu.edu and follow the Intranet/Staff Page link.
- ↪ Make plans to attend the **South Central Goat Conference** scheduled for October 23 and 24, 2009 at the Celebration Centre in Lyons, Kansas. Registration will begin at 6:30 p.m. on Friday, October 23, followed at 7:00 p.m. with "Caprine Artificial Insemination." Topics covered on Saturday, October 24, include FAMACHA Training; Livestock Selection; Necessities for the Kidding Barn and more. Lunch is included in the registration. Pre-registration is due by October 16. For more information, contact Jonie James (316-284-6930; jjames@ksu.edu) or Kent McKinnis (620-662-2371; mckinnis@ksu.edu)
- ↪ Don't miss out on the **Kansas Meat Goat Association 2009 Production Sale** which will be held on October 24 at the Celebration Centre in Lyons, Kansas. For more information, contact Vanessa Ochs (785-418-6530; goats2kid@yahoo.com).
- ↪ Thirteen **Burn Workshops** will be conducted this fall across central and eastern Kansas. Those attending will learn the basics of conducting a prescribed burn on rangelands and Conservation Reserve Program (CRP) acres.

Prescribed burning is used to improve and maintain healthy grasslands, improve livestock performance, improve wildlife habitat, reduce brush and weeds, and reduce the incidence of wildfire. Information about safety, weather, equipment, liability, and planning and conducting a burn will be presented. The schedule of workshops is:

Nov. 3	Howard
Nov. 9	Ellsworth Co.
Nov. 10	Lincoln
Nov. 12	Clay Center
Nov. 16	Greensburg
Nov. 17	McPherson
Nov. 18	Kingman Co.
Nov. 19	Parsons
Nov. 24	Abilene
Nov. 30	Hiawatha
Dec. 1	Lyons
Dec. 3	Smith Center
Dec. 7	Iola

For more information, contact the Farm Service Agency, Natural Resources Conservation Service, or Kansas State University Extension offices in these locations or Carol Blocksom (785-532-0416; blocksom@ksu.edu).

- ↪ Join us for the second "**Youth Livestock Listening Session**" on November 12 at the Kansas State Fairgrounds in Hutchinson. We will begin at 1:00 p.m. Representatives from Kansas State Fair, Kansas Junior Livestock Show, Kansas FFA, Kansas 4-H, and K-State Research and Extension will be on hand to hear your comments and suggestions. Please contact Sharon Breiner, Youth Livestock Coordinator, with questions at (785) 532-1264 or sbreiner@ksu.edu. If you are unable to attend, please send written comments to Sharon Breiner.

↳ The **2009 KSU Swine Day** will be held Thursday, November 19, at the KSU Alumni Center. The schedule for the event includes:

- 8:00 a.m. – 5:00 p.m. Trade Show
- 9:45 a.m. Welcome – *Dr. Ken Odde*
- 10:00 a.m. Update on Current K-State Swine Research – *K-State Swine Team*
- 11:00 a.m. Impact of H1N1 on the Global Swine Industry – Panel Discussion
Dr. Steve Henry, Abilene Animal Hospital, coordinator
Dr. Ingrid Garrison, State Public Health Veterinarian, KDHE
Dr. Liz Wagstrom, Assistant Vice President, National Pork Board
- 12:00 noon Lunch
- 1:30 p.m. Continued Update on Current K-State Swine Research – *K-State Swine Team*
- 2:00 p.m. What do Current Economic Signals Mean for the Future of the Swine Industry?
Kent Bang, Bank of the West, Omaha, Nebraska
- 3:30 p.m. Reception with K-State Ice Cream

Pre-registration fee is \$15 per participant by November 8; with registration at the door \$25 per participant. There is no charge for any students if they are pre-registered. Visit www.KSUswine.org for complete schedule and registration information. For more information, contact Jim Nelssen (jnelssen@ksu.edu; 785-532-1251).

↳ The **2009 Range Beef Cow Symposium** is scheduled for December 1 – 3, at the Casper Events Center in Casper, Wyoming. Focused on beef production issues, this meeting regularly attracts 800 to 1,200 attendees and more than 80 agribusiness booth vendors for the three day event. One of the most popular aspects of the Range Beef Cow Symposium is the the nightly “Bull Pen Sessions” where the invited speakers are brought back as panelists and are available for informal questions-and-answer sessions. For more details on the program and registration, contact Steve Paisley at the University of Wyoming (307-837-2000; spaisley@uwyo.edu). For more information, contact Sandy Johnson (785-462-6281; sandyj@ksu.edu)

CALENDAR OF UPCOMING EVENTS		
Date	Event	Location
October 20-22, 2009	K-State Research and Extension Annual Meeting	Manhattan
October 23-24, 2009	South Central Goat Conference	Lyons, KS
October 24, 2009	KMGA 2009 Production Sale	Lyons, KS
November 3, 2009	Burn Workshop	Howard, KS
November 9, 2009	Burn Workshop	Ellsworth County
November 10, 2009	Burn Workshop	Lincoln, KS
November 12, 2009	Burn Workshop	Clay Center, KS
November 12, 2009	Youth Livestock Listening Session	Hutchinson, KS
November 16, 2009	Burn Workshop	Greensburg, KS
November 17, 2009	Burn Workshop	McPherson, KS
November 18, 2009	Burn Workshop	Kingman County
November 19, 2009	Burn Workshop	Parsons, KS
November 19, 2009	KSU Swine Day	Manhattan
November 24, 2009	Burn Workshop	Abilene, KS
November 30, 2009	Burn Workshop	Hiawatha, KS
December 1-3, 2009	Range Beef Cow Symposium	Casper, WY
December 1, 2009	Burn Workshop	Lyons, KS
December 3, 2009	Burn Workshop	Smith Center, KS
December 7, 2009	Burn Workshop	Iola, KS

AS&I FACULTY SPOTLIGHT



Karol Fike (karol@ksu.edu; 785-532-1104)
Assistant Professor

Dr. Karol Fike was raised on a diversified crop and livestock (beef cattle and sheep) operation in eastern Iowa. She completed her B.S. degree in Animal Sciences at Iowa State University in 1991. Karol continued her education at the University of Nebraska-Lincoln, earning her M.S. and Ph.D. studying reproductive physiology in beef cattle.

Karol has a passion for teaching and working with students. She taught courses in Anatomy and Physiology, Human Nutrition, and Biology at Western Iowa Tech Community College. She spent four years on faculty at Ohio State University teaching Introductory Animal Sciences, Animal Products, advising students, and coordinating the undergraduate internship program.

Here at K-State, Dr. Fike advises students, assists in coordination of the Academic Quadrathlon, teaches Physiology of Reproduction in Farm Animals and team-teaches Beef Science. Research interests include performance of electronic animal identification technologies and cattle reproductive physiology.

Karol, her husband Gary, and 3 children, Jackson, Marshall, and Grace live near Westmoreland, Kansas.



Lily Edwards (lne@ksu.edu; 785-532-0938)
Assistant Professor

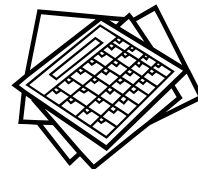
Dr. Lily Edwards grew up in Rhode Island. She completed her B.A. in French at Amherst College in 2002. After teaching in Belgium for a year after graduating, she decided to continue her education in Animal Science, an area that she was always interested in but had not pursued as an undergraduate. She received her M.S. at the University of Rhode Island in 2006 studying behavior and welfare of captive zoo species. She completed her Ph.D. at Colorado State University in 2009 focusing on understanding and minimizing pre-slaughter stress of swine.

Dr. Edwards advises students, teaches the Behavior of Domestic Animals (ASI 655) and is involved in research. Her appointment is 40% teaching and 60% research. Her research interests include understanding the relationship between physiology and behavior to improve livestock animal welfare. Current projects focus on using blood lactate concentration as an indicator of stress in

pigs during the pre-slaughter marketing process.

WHAT PRODUCERS SHOULD BE THINKING ABOUT...

WHAT PRODUCERS SHOULD BE THINKING ABOUT IN DECEMBER



BEEF -- *Tips by Dale Blasi, Extension Beef Specialist*

Cow herd management for spring-calving cows

- In late fall and early winter, start feeding supplement to mature cows using these guidelines:
 - Dry grass — 1-2 pounds (lb.) per day of a 40% crude protein (CP) supplement
 - Dry grass — 3-4 lb. per day of a 20% CP supplement
 - Dry grass — 10 lb. good nonlegume hay, no supplement needed
- Compare supplements based on cost per pound of nutrient.
- Utilize crop residues.
- Strip-graze or rotate cattle to improve grazing efficiency.
- Cows in average body condition can be grazed at 1-2 acres per cow for 30 days, assuming normal weather. Available forage is directly related to grain production levels.
- Limiting nutrients are usually rumen degradable protein, trace minerals and vitamin A.
- Control lice.

General management

- Document your cost of production by participating in Standardized Performance Analysis (SPA) programs.
- Review management decisions; lower your costs per unit of production.
- Check your financial management plan and make appropriate adjustments before the end of the year.

We need your input! If you have any suggestions or comments on **News from KSU Animal Sciences**, please let us know by e-mail to lschrein@ksu.edu, or phone 785-532-1267.