



Newsletter from the Department of Animal Sciences and Industry
 218 Weber Hall - Kansas State University - Manhattan, KS 66506
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UPCOMING EVENTS...

May, 2014

News from KSU Animal Sciences

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- What Producers Should Be Thinking About...

We Need Your Help!

Please send questions, comments or ideas for future newsletter topics to lschrein@ksu.edu or call (785) 532-1267.

➤ Top Hand Awards to be given at K-State Cattle Feeders College on May 22.

The 2014 K-State Cattle Feeders College will be held on May 22 at the Haskell County Commercial Building, Sublette, KS. Registration begins at 5:00 p.m. followed by dinner at 5:30 p.m. There will be an introduction of speakers and presentation of the "Top Hand" awards at 5:30 p.m. Topics for the event include:

Managing of High Health Risk Cattle: Thinking Outside the Shots!

Dr. Dan Thomson, K-State College of Veterinary Medicine

Building a Better Stock Horse and Cattle Handling (Live Demo)

Mr. Scott Bagley, Bagley Performance Horses, Dimmitt, TX

Feed Mixer Technology - *Mr. Mark Cooksey, Roto-Mix LLC, Dodge City, KS*

Truck Service and Maintenance - *Mr. Mark Holderness, Dodge City International, Dodge City, KS*

There is no cost to attend, but registration is required by May 16, 2014. To register, please contact Dr. Justin Waggoner (620-275-9164; jwaggon@ksu.edu) or Lacey Noterman (620-675-2261; lnote@ksu.edu). For more information, go to www.southwest.ksu.edu.

- The Developing and Implementing Your Company's HACCP Plan for meat, poultry, and food processors will be held June 3-5, 2014 in Weber Hall, Kansas State University, Manhattan. Registration for the 2.5 day International HACCP Alliance accredited workshop is online at <http://animalscience.unl.edu/web/anisci/ANSCExtensionMeatScienceHACCPInformationandCoursesRegistration>. The workshop fee is \$375 per person, and meets USDA training requirements to become a HACCP trained individual. For more information, contact Dr. Liz Boyle at lboyle@ksu.edu or 785-532-1247.

- The KSU Youth Horse Judging Camp – Beginners Section will be held June 5, 2014 and the KSU Youth Horse Judging Camp – Advanced Section will be held June 3-4, 2014. The advanced camp is currently full but there are still a few spots left in the beginners section. T-shirts cannot be guaranteed for late registrants. For more information, visit the website www.asi.ksu.edu/p.aspx?tabid=1141. You can also contact Teresa Douthit, (785-532-1268, douthit@ksu.edu) or Tasha Dove at (tashakd@ksu.edu).

- K-State Livestock Judging Camps - A three day, intense judging camp designed for 4-H and FFA members ages 14-18 who are seriously interested in enhancing their livestock judging and oral communication skills. Prior livestock judging experience is necessary for this camp. Workouts will be conducted similar to those at a collegiate level. Chris Mullinix, coach of over 30 national championship teams and KSU livestock judging coach, will conduct the training for each camp. The camp will focus primarily on the proper format, terminology, and presentation of oral reasons. Camp participants will also be exposed to livestock evaluation skills and incorporating performance records in the decision making process. The following dates are set for the 2014 camps: June 9-11; June 13-15; and June 17-19. The registration deadline is May 21. Please read the camp information at <http://www.asi.k-state.edu/doc/judgingcamp14.pdf>.



↪ **K-State Animal Sciences Leadership Academy Planned for June 11-14, 2014.** Kansas State University will host the sixth Annual K-State Animal Sciences Leadership Academy June 11-14 for young livestock industry leaders. This four-day event will focus on increasing young leaders' knowledge of Kansas' diverse livestock industry as well as building participant's leadership skills. Participants will be led by Sharon Breiner, as well as three K-State students and will stay in K-State housing for the duration of the event.

↪ **The 2014 Beef Improvement Federation (BIF) Research Symposium and Convention is set for June 18-21, 2014, in Lincoln, Nebraska.** - For nearly 50 years the Beef Improvement Federation has hosted their annual research symposium and convention. The convention serves to facilitate discussion and provide education on current issues facing the beef industry. This year, US MARC will be hosting pre-conference tours on Tuesday (all day) and Wed. morning. Tours can be arranged by contacting Janel Nierman (Janel.Nierman@ARS.USDA.GOV; 402-762-4110). For the latest information about the 2014 BIF Symposium and Convention along with registration and hotel information, visit www.beefimprovement.org.

↪ **2014 Dr. Bob Hines' Kansas Swine Classic planned for July.** The 2014 Dr. Bob Hines Swine Classic is scheduled for July 11-12, 2014, at CiCo Park in Manhattan. This two-day event includes educational workshops, showmanship contest, and a prospect and market hog show. It is open to all Kansas youths ages 7 through 18 as of January 1, 2014. **All purebred pigs (both prospect and market) must have registration papers provided at time of check-in to qualify for the purebred classes.** This year's Classic will feature an Extemporaneous Speaking Contest and Swine Photography Contest along with an educational program which includes information on "PEDv: Status Update and Future Implications for Youth Projects."

For the Speaking Contest, participants will register on-site for the contest. The contestant will draw three livestock and ag-related topics out of a pool of topics. They will then select which topic they wish to speak about from the three options and will be given 30 minutes to prepare a speech. Contestants will then give their 3-7 minute speech in front of a judge and spectators who wish to listen. Guidelines and criteria for the speech will be given to the contestants at check-in.

For the Swine Photography Contest, youth may submit up to 2 swine photos. Photos should be 8x10 size and should not be framed or matted. Photos will be placed in plastic sleeves and displayed throughout the weekend. Outlined below is a schedule of this year's program.

Friday, July 11

12:00 p.m. All hogs in place
 1:00 p.m. Swine photo check-in by the show ring
 1:15 p.m. Extemporaneous Speaking Contest Check-in by the show ring
 1:30 p.m. PEDv: Status Update and Future Implications for Youth Projects
 3:30 p.m. Ice cream party by the show ring
 5:30 p.m. Showmanship Contests

Saturday, July 12

8:30 a.m. Prospect Hog Show followed by Market Hog Show

Entries close on July 1, 2014 (must be postmarked by June 29, 2014). More information and registration is available at www.KSUswine.org. For more information, contact Joel DeRouchey (785-532-2280; jderouch@ksu.edu), or Jim Nelssen (785-532-1251; jnelssen@ksu.edu)

CALENDAR OF UPCOMING EVENTS		
Date	Event	Location
May 22, 2014	K-State Cattle Feeders College	Sublette, KS
June 3-4, 2014	KSU Youth Horse Judging Camp – Advanced Section	Manhattan
June 3-5, 2014	Developing and Implementing HACCP in Meat, Poultry & Food Processing	Manhattan
June 5, 2014	KSU Youth Horse Judging Camp – Beginners Section	Manhattan
June 9-11, 2014	K-State Livestock Judging Camp	Manhattan
June 11-14, 2014	K-State Animal Sciences Leadership Academy	Manhattan
June 13-15, 2014	K-State Livestock Judging Camp	Manhattan
June 17-19, 2014	K-State Livestock Judging Camp	Manhattan
June 18-21, 2014	Beef Improvement Federation Symposium and Annual Meeting	Lincoln, NE
July 11-12, 2014	Dr. Bob Hines' Kansas Swine Classic	Manhattan

WHAT'S NEW.....

Management Minute "Employee Buy-In"

↪ Management Minute – Chris Reinhardt, Ph.D., Extension Feedlot Specialist "Employee Buy-In"

Every manager hopes that the entire team "buys in" to the leadership's vision for the ultimate goals for the company and for how leadership hopes to approach those goals. But how often does the manager ask, "Have I 'bought in' to my people?"

I recently listened to a highly successful agricultural entrepreneur discuss compensation philosophy, indicating that providing an ownership stake in the company had dramatically reduced turnover and improved the team atmosphere of the entire company.

When the company is growing and is profitable this is obviously an effective way to compensate employees and yet defer the compensation all at once. But providing some kind of stake in the company is about so much more than the immediate dollars and cents value, either present value or future value.

By providing a tangible ownership stake in the company, employees almost cannot help but "take ownership" in the grander vision and direction of the organization. It is in their own financial best interest to give 100% to help accomplish company goals. To do this, they must either simply passively accept the direction, actively participate in development of the vision, or at least commit time and energy to understanding why this direction is best for the company.

It is much more difficult, both financially and emotionally, to leave something which you own than something which simply pays you every other week. Because you bought into the vision, you may have invested deeply in developing the systems in place to help accomplish company goals---this is partly your baby. And when you ultimately deliver on the company goals, you will reap the rewards, both financial and emotional. To leave the company before this is accomplished will take a serious upheaval event.

So as you're developing your compensation program for employees, don't restrict your thinking to short-term salaries and conventional insurance packages. Consider ways to encourage long-term thinking and long-term buy-in by new and existing employees, to make it difficult for them to consider leaving something they've helped to build.

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

↪ Feedlot Facts – Chris Reinhardt, Ph.D., Extension Feedlot Specialist and K.C. Olson, Range Nutritionist

"Don't Wait....part II"

Spring is here---finally. However, many ranchers in the western regions have not received adequate winter and spring precipitation to sustain normal grazing pressure throughout the coming summer grazing season.

In addition to their substantial financial investment, ranchers have an emotional investment in their range lands as well. This is to be expected; their range resource is the source of their livelihood, the primary source of nutrients for their cow herd, and is likely to have been in their family's possession for generations. Unfortunately, like anything else to which we become emotionally attached, this emotional attachment handicaps us from making completely objective decisions regarding the disposition of this precious asset.

An effective drought management plan is made up of a combination of **objective measures** of precipitation and forage growth with **critical trigger dates** when decisive action must be made with respect to grazing pressure in the interest of long-term preservation of range productivity. The objective measures help overcome some of the emotional attachment, and the critical trigger dates have been previously set based on knowledge of the stages of plant growth and the plants' need for regeneration.

Feedlot Facts "Don't Wait...part II"

↪ Feedlot Facts – “Don’t wait....part II” (cont.)

The critical dates will vary based on your geography, but one example of a simple set of sequential, “if-then” guidelines for ranchers in northeast Kansas may be as follows:

- 1) **April 1:** IF < 15% of average annual moisture (measured from November 1 through April 1) has been received,
THEN prescribed burns are cancelled.

- 2) **June 30:** IF < 80% of average annual moisture has been received,
THEN decrease stocking rate by 30%. Removing calves from cows and the range will reduce grazing pressure by approximately 30%.

IF < 60% of average annual moisture has been received,
THEN decrease stocking rate by 40% (both early weaning and additional light culling of the cow herd).

- 3) **September 1:** IF < 70% of average July-August moisture has been received,
THEN remove all cattle from the pastures. Adequate leaf are between August 15 and the first killing frost is critical for root carbohydrate restoration; continued grazing will harm next spring’s new grass growth, regardless of future precipitation.

- 4) **November 1:** IF < 80% of average annual precipitation has been received (measured from November 1 – October 31, considered the “water-year”, and moisture received during this period is indicative of forage productivity),
THEN drought conditions will likely persist into the following spring and herd reductions should be anticipated.

Any adjustments to stocking density, including early weaning and herd culling, also must take into account changes to “normal” marketing. Producers may choose to feed calves to a more conventional weight to recapture reduced gross revenue.

These adjustments are not implemented lightly, but building a sound, scientific range management plan, and rigorously adhering to the trigger dates will yield long-range benefits. Protect your most valuable asset; keep your eyes way out in front and you will ultimately be rewarded.

For more information contact Chris at cdr3@ksu.edu.

↪ Comparison of Conventional and Alltech Beef PN Finishing Programs: Performance and Carcass

Characteristics - We fed 512 crossbred steers in our experiment for 175 days to compare the Alltech (Nicholasville, KY) PN Beef program to traditional feed additives, in the presence or absence of exogenous growth promotants. Steers were assigned to either a conventional finishing diet or a diet using the Alltech PN Receiver and Finisher supplements. Both diets were fed with or without the use of exogenous growth promotants (Component implants and Optaflexx; Elanco Animal Health, Greenfield, IN). After 175 days, animals were harvested and carcass data were collected. The objective was to evaluate effects of the PN Feed Program, alone or in combination with exogenous growth promotants, on feedlot performance and carcass characteristics.

Bottom Line... Replacing conventional feedlot diets with Alltech PN Program diets yielded similar feedlot performance and carcass characteristics, and the use of implants and Optaflexx greatly improves feedlot performance and carcass characteristics in both systems. 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).

↪ Relationships Between Docility and Reproduction in Angus Heifers – This research explored the possible relationships between docility and pregnancy rate. It has been hypothesized that differences in temperament scores and associated cortisol levels of heifers are associated with differences in pregnancy rate. A total of 337 first-calf heifers were used in this study from three different cooperator herds. Fecal and blood samples were collected and analyzed for cortisol concentrations. Data were analyzed using logistic regression to determine the factors that influenced pregnancy rate. Contemporary group based on ranch was fit as a fixed effect, whereas fecal cortisol, blood cortisol, exit velocity, chute score, weight, and age were included as covariates. Correlations were also calculated.

We detected no significant predictors of 30-day pregnancy for two of the three ranches from the combined data; however, the chute score and weight were found to have an odds ratio estimate different than 1 as significant predictors of 30-day pregnancy. There were many significant correlations between covariates.

Bottom Line... Although the results from our combined data were not conclusive for predictors of 30-day pregnancy, results from one ranch and variation in measures of temperament and reproductive status showed

that these traits can be improved. View the complete research report at www.asi.ksu.edu/cattlemensday. For more information, contact Bob Weaver (785-532-1460; bweaver@ksu.edu).

↪ **Aging Time Affects Color Stability and Sensory Properties of Ground Beef Patties Adjusted to a Similar Fat Composition by Combining Subprimals from the Chuck Roll and Knuckle** - This study was designed to determine effects of two quality grades (Premium Choice and Select) and pre-processing vacuum-storage aging time of 7, 21, and 42 days on ground beef patty display color from chuck roll and knuckle subprimals combined to obtain a common fat percentage. After aging for 7, 21, or 42 days, Premium Choice or Select knuckles and chuck rolls were ground and combined to achieve a similar fat content for each quality grade and aging time treatment. Ground beef patties were formed, placed in polyvinyl chloride-overwrapped trays, and displayed in a coffin-type retail case. Color was evaluated at 0, 24, 48, and 72 hours of display by a trained panel. Frozen, vacuum-packaged patties were thawed, cooked to 160°F, and evaluated for sensory and instrumental properties.

Bottom Line...As subprimal aging time is increased, ground beef patties deteriorate in color at a more rapid rate. Extended aging for 42 days results in more off-flavors, and instrumental measures indicate that aging increases tenderness and reduces hardness. View the complete research report at www.asi.ksu.edu/cattlemensday. For more information, contact John Unruh (785-532-1245; junruh@ksu.edu) or Elizabeth Boyle (785-532-1247; lboyle@ksu.edu).

↪ **Evaluating the Effects of an Algae-Modified Montmorillonite Clay in Diets Contaminated with Deoxynivalenol on Nursery Pig Growth Performance** - A total of 280 nursery pigs (PIC 327 × 1050, initially 21.9 lb and 35 d of age) were used in a 21-d growth trial to evaluate the effects of an algae-modified montmorillonite clay (MMi) on nursery pig performance when fed diets contaminated with deoxynivalenol (DON). Pigs were allotted to pens by weight, and pens were randomly assigned to 1 of 5 dietary treatments arranged in a 2 × 2 + 1 factorial with 7 pigs per pen and 8 pens per treatment. All experimental diets were pelleted. Mycotoxin analyses were conducted on the main ingredients at NDSU and LDA labs, and these results were used in diet formulation. Naturally contaminated wheat (10.7 ppm DON) was used to produce diets with approximately 5 ppm DON. The 5 treatments consisted of 2 positive control diets that did not contain DON contamination with or without 0 or 0.50% MMi and 3 negative control diets that were contaminated with 5 ppm of DON and contained 0, 0.25%, or 0.50% MMi. No DON × MMi interactions were observed for the entire study. Overall (d 0 to 21), ADG, ADFI, and d 21 BW decreased in pigs fed DON-contaminated diets regardless of MMi addition. Feed efficiency was poorer for pigs fed diets with DON due, primarily to poor feed efficiency in the initial period (d 0 to 7). Pigs fed diets contaminated with DON had greater BW variation (CV) within pen on d 21. Although the addition of 0.5% MMi to diets restored ADFI from d 14 to 21, no other treatment differences were observed for MMi inclusion.

Bottom Line...This study suggests that including MMi will not offset reductions in nursery pig performance caused by high DON levels (> 5 ppm) when diets are fed in pellet form. More information is available on this experiment and others in the KSU Swine Day Report at www.KSUswine.org. (This study conducted by J.A. Erceg, H.L. Frobose, M.D. Tokach, J.M. DeRouchey, S.S. Dritz, R.D. Goodband, and J.L. Nelssen)

↪ **Effects of Dietary Zinc Level and Ractopamine HCl on Pork Chop Tenderness and Shelf-Life Characteristics** - A total of 320 finishing pigs (PIC 327 × 1050; initially 216 lb) were utilized to determine the effects of adding Zn to diets containing ractopamine HCl (RAC) on muscle fiber type distribution, fresh chop color, and cooked meat characteristics. Dietary treatments were fed for approximately 35 d and consisted of: a corn-soybean meal-based negative control (CON); a positive control diet with 10 ppm of RAC (RAC+); and the RAC+ diet plus 75, 150, or 225 ppm added Zn from either ZnO or Availa-Zn. Loins from 80 barrow and 80 gilt carcasses were evaluated. No Zn source effect or Zn source × level interactions were observed during the study. Pigs fed the RAC+ had increased percentage type IIX and a tendency for increased percentage type IIB muscle fibers. Increasing added Zn decreased percentage type IIA and tended to increase IIX muscle fibers. On d 1, 2, 3, 4, and 5 of display, pork chops from pigs fed the RAC+ treatment had greater L* values (lighter) compared with the CON. On d 0 and 3 of display, increasing added Zn tended to decrease L* values and decreased L* values on d 1, 2, 4, and 5. Pigs fed RAC+ had decreased a* values (less red) on d 1 and 4 of display and tended to have decreased a* values on d 0 and 2 compared with CON pork chops. RAC+ decreased metmyoglobin reducing ability (MRA) of pork chops on d 5. Chops from pigs fed added Zn had increased MRA on d 3 and 5 of the display period. There was a trend for increased cooking loss as added Zn increased in RAC diets.

Bottom Line...RAC+ diets produced chops that were lighter and less red but maintained a higher percentage of surface oxymyoglobin throughout a 5-d simulated retail display. RAC+ reduced MRA at the end of the display period, but supplementing Zn to RAC diets restored MRA to near CON treatment levels at the end of the display period. More information is available on this experiment and others in the KSU Swine Day Report at www.KSUswine.org. (This study conducted by C.B. Paulk, M.D. Tokach, J.L. Nelssen, D.D. Burnett, M.A. Vaughn, K.J. Phelps, S.S. Dritz, J.M. DeRouchey, R.D. Goodband, T.E. Houser, K.D. Haydon, and J.M. Gonzalez)

AS&I Faculty Spotlight



Jaymelynn Farney (ijk@ksu.edu; 620-421-4826 ext. 17)

Assistant Professor/Extension Beef Systems Specialist

Jaymelynn Farney grew up in Fort Sumner, New Mexico where her family had a cow-calf operation. Jaymelynn was very active in 4-H and FFA and because of this after graduating high school she went to El Dorado, KS to be a member of the livestock judging team at Butler Community College. She completed her A.S. in Agriculture degree and then continued her education at Kansas State University in Animal Science. Jaymelynn then went to Oklahoma State University to complete her M.S. in Ruminant Nutrition with an emphasis on receiving calf management. She then returned to Kansas State University to complete her PhD in Ruminant Nutrition, using the dairy cow as the model for how inflammation impacts production. Jaymelynn plans to focus her applied research programs on dealing with issues pertaining to Southeast Kansas cattle producers. Subsequently, she plans on researching fescue management, heifer and bull development programs, and stocker/backgrounding management systems. Additionally, Jaymelynn plans on using her extension appointment to provide

producers with knowledge of new technologies, feeds, and management strategies to improve efficiency of production in both cow-calf and stocker/backgrounder operations.

Jaymelynn lives in Southeast Kansas with her husband Garet, and works at the Southeast Agricultural Research Center in Parsons.



Sandy Johnson (sandyj@k-state.edu; 785-462-6281)

Associate Professor/Extension Livestock Production Specialist

Sandy Johnson was raised on a diversified livestock farm north of Blair, Nebraska. An active 4-Her, her projects included cattle, swine, sheep and horses. She received a B.S. degree in Animal Science from the University of Nebraska in 1982 and a M.S. degree in Reproductive Physiology from the University of Missouri in 1984. A deep appreciation for applied integrated research was developed during three years spent working as a research technician at the University of Nebraska West Central Research and Extension Center in North Platte. A move to West Virginia was made to pursue a Ph.D. Her dissertation examined the role of the follicle in the formation of short-lived corpora lutea in postpartum beef cows. Sandy received a Ph.D. degree from West Virginia University in Reproductive Physiology in 1991 and continued there as a post doctoral fellow until 1993. She held a teaching position at Fort Hays State University before beginning her current position in October of 1998 as Extension Livestock Specialist at the Northwest Research and Extension Center in Colby.

Sandy is a member of the North Central Region Bovine Reproductive Task Force which has hosted the Applied Reproductive Strategies in Beef Cattle Workshops, updated the Estrous Synchronization Planner and organized the Beef Cattle Reproduction Leadership Team. All efforts are aimed at promoting wider adoption of reproductive technologies among cow-calf producers and to educate cow-calf producers in management considerations that will increase the likelihood of successful AI breeding. Her research interests include the areas of estrous synchronization, costs of breeding systems and cow/calf management.



Justin Waggoner (jwaggon@k-state.edu; 620-275-9164)

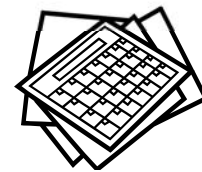
Associate Professor/Extension Beef Systems Specialist

Justin Waggoner was hired as the Beef Systems Specialist at Kansas State University's Southwest Area Extension Office in Garden City. Waggoner was raised on his family's farm in central, Kansas and obtained his Bachelor's (2000) and Master's (2001) degrees in Animal Science from Kansas State University. He completed his Doctorate in Ruminant Nutrition at New Mexico State University in 2007 where his work evaluated the impacts of morbidity on performance and profitability in feedlot cattle and nutrient utilization in stressed cattle. "As a Kansas native, I am excited about the opportunity to serve beef cattle producers and county agents in Southwest Kansas."

Waggoner hopes to assist beef cattle producers in all sectors of the industry by providing them with information regarding nutritional and management strategies that improve profitability. Waggoner also intends to continue pursuing his research interests regarding the influence of nutrition and management practices on cattle health and performance.

What Producers Should Be Thinking About.....

WHAT PRODUCERS SHOULD BE THINKING ABOUT IN JULY.....



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

Cowherd Nutrition

- Provide plenty of clean, fresh water.
- Provide free-choice mineral to correct any mineral deficiencies or imbalances.
 - ✓ Monitor intake to insure levels are consistent with label specifications.
- Monitor grazing conditions and rotate pastures if possible and/or practical.
- If ammoniated wheat straw is planned for winter needs, follow these rules:
 - ✓ Best time is immediately after harvest, prior to weather deterioration.
 - ✓ Ammoniation process is temperature sensitive, fastest during hot days.
 - ✓ Apply 3% Anhydrous Ammonia (60 pounds/ton of straw).
 - ✓ Do ***not*** ammoniate wheat hay or any other intermediate or high quality forage; production of imidazole can cause cattle hyperactivity and death.
 - ✓ Will double crude protein content, enhances intake, and be cost effective.
- Consider early weaning if drought conditions develop and persist.
- Consider creep feeding only if cost effective.

Herd Health

- Monitor and treat Pink Eye cases.
- Provide fly control. Consider all options, price and efficiency will dictate the best option(s) to use.
- Monitor and treat foot rot cases.
- Avoid handling and transporting cattle during the hottest part of the day-reduce heat stress.
- Vaccinate replacement heifers for Brucellosis if within proper age range (4 - 10 months).
- Continue anaplasmosis control program (consult local veterinarian).

Forage/Pasture Management

- Check and maintain summer water supplies.
- Place mineral feeders strategically to enhance grazing distribution.
- Check water gaps after possible washouts.
- Harvest hays in a timely manner, think quality and quantity.
- Harvest sudan and sudan hybrids for hay in the boot stage (normally three to four feet in height). It is a good idea to run a routine nitrate test on a field before harvesting hay.
- Plan hay storage placement wisely. Putting hay conveniently near feeding sites reduces labor, time demands, and equipment repair cost.

General Management

- Good fences and good brands make good neighbors.
- Check equipment (sprayers, dust bags, oilers, haying equipment) and repair or replace as needed. Have spare parts on hand, down time can make a big difference in hay quality.

*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.*