



March 2004

Department of Animal Sciences and Industry

<http://www.oznet.ksu.edu/ansi/nletter/beeftips.htm>

Upcoming Events

KSU-MU CAT PAWS

Forage Meeting

March 4

Seneca, Kan.

Contact: David Key
(785) 336-2184

Cattlemen's Day

March 5

Manhattan, Kan.

www.oznet.ksu.edu/pr_cattleday/

Cow Reproduction Meeting

March 9

Emporia, Kan.

Contact: Brian Creager
(620) 341-3220

See more upcoming events on page 2.

Researchers develop new traits in annual forages

Ron Hale, livestock specialist

Research has led to the development of two new traits in summer annual forages. **Photoperiod-sensitive (PPS)** and **brown mid-rib (BMR)** traits result from conventional plant-breeding programs and occur separately or in combination. Annual forages with these traits have been developed for grazing, haying or ensiling. These traits can influence forage yield and quality. PPS and BMR forages have been shown to use water more efficiently than corn.

Photoperiod sensitive plants grow vegetatively, producing stem and leaves, until days are less than approximately 12 hours and 20 minutes long. Then the reproductive stage begins and the plant heads in three to four weeks. The extended vegetative growth allows for high forage production, especially when planted early, and delayed heading provides a wider harvesting window. PPS types of forage sorghum, sorghum-sudangrass and hybrid pearl millet have been developed.

Researchers in Kansas, Oklahoma and Texas have reported PPS yields ranging from 2.5 to 29.6 tons of dry matter per acre with crude protein of 4.6 to 10.7 percent depending on factors such as variety, location, available water, cuttings, year and plant maturity at cutting. The same data showed yield and crude protein ranges of 3.4 to 26.6 tons per acre and 3.5 to 12.3 percent, for conventional non-PPS and non-BMR forages, respectively. PPS types generally will have higher dry-matter yields and lower crude protein content compared to non-PPS forages, BMR forages and corn.

Research conducted in Texas also reported that PPS decreased digestibility and energy content because of a higher lignin content. Photoperiod-sensitive forages may be more useful in high-energy/low-roughage finishing diets, which are less sensitive to forage digestibility and energy content, than in high-roughage growing or dairy rations.

Brown mid-rib types of corn, forage sorghum, sorghum-sudan, and pearl millet have been developed. The term BMR denotes the color of the vein in the middle of the leaf. The yellow to brown color is a marker for an important trait: 25 to 50 percent lower lignin content in the leaves and stalks compared to non-BMR types harvested at similar maturities. Reduced lignin levels improve energy content and digestibility. Increased forage intake by livestock is also associated with improved digestibility.

Palatability is also improved by lowering the lignin content. When allowed to selectively graze, cattle show a preference for all but the lower 8 to 20 inches of stalk for a BMR sorghum-sudan before grazing a conventional sorghum-sudan or forage sorghum. Sheep have also shown a grazing preference for a sorghum-sudangrass BMR over a comparable non-BMR forage.

BMR forage has been reported in Kansas, Oklahoma and Texas to yield between 2.2 to 25.0 tons dry matter per acre with crude protein content of 4.0 to 12.4 percent. On average, dry-matter yields are typically lower, and crude protein levels typically higher than non-BMR, PPS and corn. As with the PPS annual forages, BMR yields

continued on page 2

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Upcoming Events

Roundup

April 1
Hays, Kan.
(785) 625-3425

Beef Industry Issues and Data Use Meeting

April 8
Oakley, Kan.
Contact: Jamie
Schmitt
(785) 672-3245

BIF Annual Convention

May 25
Sioux Falls, SD
www.beefimprovement.org

from page 1

vary depending on variety, location, available water, cuttings, year, and plant maturity at cutting.

Research from Indiana showed improved gain of calves (2.3 versus 2.1 lbs./day) and cows (142 versus 116 total lbs.) when grazing a BMR or a non-BMR sorghum-sudan hybrid, respectively. Texas research reported calves grazing a BMR sorghum-sudan had better average daily gain (2.94 versus 2.62 lbs.) and gain per acre (337 versus 300 lbs.) compared to those grazing non-BMR at similar stocking rates.

The same researchers reported that gain and conversion of heifers on a finishing ration containing a BMR forage sorghum silage or corn silage were similar. The lower lignin content with the associated improvement in digestibility and energy would make the BMRs well suited for improved animal performance on high-roughage diets.

PPS types have minimal lodging (up to 10 percent). BMR forages are more susceptible to lodging (up to 83 percent) because of less lignin and a resulting weaker stalk. Although rates will vary among non-BMR summer annuals (0 to 77 percent), lodging is more common in the BMRs. However, several of the newer types are less prone to lodge. Planting rate and row width can affect lodging.

Prussic acid and nitrate poisoning are concerns with sorghum-based forages. Young plants or regrowth should be tested for prussic acid before grazing. Haying or ensiling the forage will eliminate prussic acid. Nitrates accumulate when a plant is stressed or a high level of nitrogen fertilizer is applied. Pasture, hay and silage samples should be tested for nitrates before grazing or feeding. The ensiling fermentation process can reduce nitrates by 50 percent in quality silage. Haying will not reduce nitrate content.

Summer annual forages with photoperiod sensitive and brown mid-rib traits can be alternatives to current forage production systems, especially corn silage. Multiyear research in Texas has shown that sorghum silage can be produced with 40 percent less water than required for corn silage production. Also, sorghum-based forages are more drought tolerant than corn. Adding the PPS trait to a BMR type creates a forage quality that is intermediate to single traits, with forage yield closer to the PPS than the BMR type. Careful selection of sorghum variety, including PPS and BMR traits, must be made for characteristics such as nutritional quality, yield and lodging. K-State has conducted summer annual forage comparisons in locations across Kansas. Contact your local K-State Research and Extension agronomist for information on variety selection and agronomic practices.

Reproduction, animal ID to headline Emporia, Oakley meetings

Synchronization of estrus and A.I. in cow herds requires more management than traditional breeding programs. However, AI can provide low-cost, high-value genetic options with the potential for high returns. To learn more about synchronization and A.I., attend a workshop on cow reproduction methods on March 9, at the American Legion Post #5, 2921 W. 12th St., in Emporia. Registration begins at 9:30 a.m., and the first speaker is at 10 a.m.

Topics include National Livestock Identification Program and available technology, cow nutrition, CIDR research, male fertility and A.I., synchronization systems and costs, breeding soundness exams, heifer development, and bull selection and EPDs.

Cost is \$15 per person, and an RSVP is required by March 5. After that date the fee is \$30 per person. Call (620) 341-3220 or e-mail bcreager@oznet.ksu.edu.

Beef Industry Issues – Playing the Cards You’re Dealt is scheduled for April 8 at the Oakley Livestock Commission in Oakley from 9:15 a.m. to 3:45 p.m.

Speakers and topics include Dr. Paul Ritter, Oakley Veterinary Service, *Carcass Traits Ultra-sound in Cattle*; Dale Blasi, K-State Research and Extension stocker, forages nutrition and management specialist, *E.I.D.*; Myron Wolken, Garity Bank, *Value of Performance Data*; Sandy Johnson, K-State Research and Extension NW Area specialist, *Use of Co-Products of the Ethanol Industry in Beef Cow Diets*; and Hallie Hasle, USDA DVM, *Protecting Your Investment from Disease*.

The cost is \$10 and lunch will be provided. RSVP by Tuesday, April 6 to the Gove County Research and Extension Office at (785) 938-4480 or the Logan County office at (785) 672-3245.

Cattlemen's Day Research Summaries

The following are a few of the summaries now available in the 2004 Cattlemen's Day report. You can get the entire report online at www.oznet.ksu.edu/ansi/beefonly.htm or contact your local K-State Research and Extension office.

Endpoint temperature, cooking method, and marbling degree have different effects on Warner-Bratzler Shear Force on beef strip loin, bottom round, and brisket muscles

E. Obuz, J. W. Stephens, M. E. Dikeman, J. P. Grobbel, and T. M. Loughin

Our objective was to determine the effects of endpoint temperature, cooking method, and marbling on Warner-Bratzler Shear Force (WBSF – an objective method for determining tenderness) of three beef muscles. Eighteen subprimals of a muscle with a low content of connective tissue, *longissimus lumborum* (strip loin), and two muscles with a high content of connective tissue, *biceps femoris* (bottom round) and *deep pectoralis* (brisket), were selected from USDA Select and Choice (Certified Angus Beef) carcasses. After 14 days of aging, subprimals were frozen, fabricated into steaks and frozen until cooking. Steaks were assigned one of two cooking methods, the Magikitch'n® electric belt grill (a rapid conduction method) or a water bath (a slower, convection method); and one of nine endpoint cooking temperatures (104, 113, 122, 131, 140, 149, 158, 167, or 176°F). According to WBSF results, optimum tenderness for the strip loin occurred around 131°F. Higher marbling protected tenderness at higher endpoint temperatures. Tenderness increased in bottom round and brisket muscles as endpoint temperature increased from 104 to 140°F, then tenderness decreased as endpoint temperature rose from 149 to 176°F. Endpoint temperature was the only significant factor affecting bottom round tenderness. Steaks cooked in the water bath had higher WBSF and were less tender than those cooked on the belt grill. This was true for both the strip loin and brisket. The effect of increasing endpoint temperature on WBSF of the strip loin was different than for the bottom round and brisket.

Effects of round bale feeding sites on soil fecal bacteria and nutrient concentrations

N. A. Lenehan, J. M. DeRouchey, T. T. Marston, M. L. Christian, and G. L. Marchin

An experiment was conducted from January to July 2003 to evaluate fecal bacteria and nutrient concentrations in soil near round bale feeders at winter feeding sites. Six-inch soil samples were taken each month from ten feeding sites, at distances of 10, 40, 70 and 100 feet from each feeder. Soil samples were taken before livestock access to the sites (January), during the feeding period (February, March and April) and after cattle had been removed from the sites (May, June, and July). Results indicate that fecal bacteria concentrations increased over the feeding period and were greatest close to round bale feeders. The data suggest that environmental contamination from fecal bacteria in the soil can occur up to 100 feet from the feeding site. For soil nutrients, the greatest increase generally occurred at 10 feet from the feeders, with few differences thereafter.

Failure to eliminate the carrier state of *Anaplasma marginale* by using long-acting injectible oxytetracycline

L. C. Hollis, D. Gnad, T. Marston, D. Llewellyn, and G. Palmer

Thirty-four *Anaplasma marginale* seropositive cows from a herd of 236 were allocated to treatments: five animals served as untreated controls, and 29 animals were treated with three injections of long-acting oxytetracycline at three-day intervals. Fourteen days after treatment initiation, 100 percent of control cows and 89 percent of treated cows had *Anaplasma marginale* present. Seventy-four days after initiation of treatment, 100 percent of control cows and 86 percent of treated cows had *Anaplasma marginale* present. Use of injectable long-acting oxytetracycline was not effective in eliminating the carrier state of *Anaplasma marginale* from infected animals.

Focus on Feedlots

The latest report from Focus on Feedlots can be found at:
www.oznet.ksu.edu/dp_ansi/nletter/fof.htm

To receive e-mail notification of the monthly report contact Linda Siebold, lsiebold@oznet.ksu.edu or 785-532-1281.

Estrus synchronization of suckled beef cows by using GnRH, prostaglandin F₂ (PGF), and progesterone (CIDR): A multi-location study

J. E. Larson, G. C. Lamb, J. S. Stevenson, T. W. Marston, S. K. Johnson, M. L. Day, T. W. Geary, D. J. Kesler, J. M. DeJarnette, F. N. Schrick, and J. D. Areseneau

Our objectives were to determine whether a fixed-time artificial insemination (TAI) protocol could yield pregnancy rates similar to a protocol requiring detection of estrus and whether inclusion of a CIDR (a vaginal insert containing progesterone) in protocols using gonadotropin-releasing hormone (GnRH) and prostaglandin F₂ (PGF) would enhance fertility. Postpartum suckled beef cows (n = 2,630) from 14 locations were randomly assigned to each of five estrus-synchronization protocols using PGF with GnRH and/or a CIDR. Protocols were Control, CO-Synch, CO-Synch+CIDR, Hybrid-Synch, and Hybrid-Synch+CIDR. The percentage of cows cycling at the initiation of estrus synchronization was 66.8 percent, the percentage of cycling cows ranging from 38 to 90 percent among locations. Overall pregnancy among locations ranged from 39 to 67 percent. Pregnancy rates were greatest for the Hybrid-Synch+CIDR (57.9 percent) treatment, although not significantly different from the CO-Synch+CIDR (53.6 percent) and Hybrid-Synch (53.0 percent) treatments, but greater than the Control (52.3 percent) and CO-Synch (43.4 percent), which yielded the poorest pregnancy rates. Overall, the Hybrid-Synch+CIDR protocol (AI after detected estrus for three days, and then a clean-up TAI) achieved the greatest pregnancy rates, but CO-Synch+CIDR is a reliable, fixed-time AI protocol that gives producers the option to eliminate detection of estrus.

Evaluation of nitrogen availability in liquid feedstuffs

E. A. Elwakeel, E. C. Titgemeyer, and J. S. Drouillard

We developed an in vitro assay to assess ruminal availability of protein in liquid feeds containing soluble protein/nitrogen. Microbial mass accumulating from the

assimilation of dietary nitrogen by ruminal microbes during an in vitro fermentation is measured. In the assay, microbial growth is most limited by the availability of protein/nitrogen, so microbial mass is proportional to the amount of available nitrogen in the sample. In liquid feeds that we generated in the laboratory, ruminal nitrogen availability decreased in response to mild heating, and the decline was greater for feedstuffs containing true protein rather than urea. Adding salt to the products decreased nitrogen availability by an average of 21 percent, and addition of 4 percent phosphoric acid decreased nitrogen availability by 50 percent. Future research will be needed to prevent negative impacts of manufacturing on protein availability.

Effects of *Lactobacillus acidophilus* and *Propionibacterium freudenreichii* on growth performance and carcass characteristics of finishing beef cattle

M. A. Greenquist, J. S. Drouillard, B. Dicke, G. E. Erickson, and T. J. Klopfenstein

There are contradicting reports of the efficacy of direct-fed microbials in finishing cattle diets. Some researchers have observed improvements in daily gain and feed efficiency when direct-fed microbials are included in finishing diets, while others have reported no differences in dry matter intake or ruminal and blood pH. Many of these studies have been small and used fewer animals per pen compared than typical commercial feedlots. In our study at a commercial feedlot, yearling crossbred beef steers and heifers (n=3,539; 796 lbs. body weight) were used to characterize growth performance and carcass characteristics associated with the supplementation of direct-fed microbials (*Lactobacillus acidophilus* and *Propionibacterium freudenreichii*) in finishing cattle diets. Including direct-fed microbials in the diet throughout a 122-day finishing period had no measurable effect on growth performance or carcass characteristics of finishing cattle.