

Center for Grassland Studies

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UNIVERSITY OF
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Meet Two of Our Students

The Center coordinates two undergraduate majors: Grazing Livestock Systems and PGA Golf Management. Below are excerpts from articles that were composed for inclusion in recent recruitment newsletters. We thought you would enjoy reading them.

Nick Sage, Senior and Teaching Assistant in PGA Golf Management

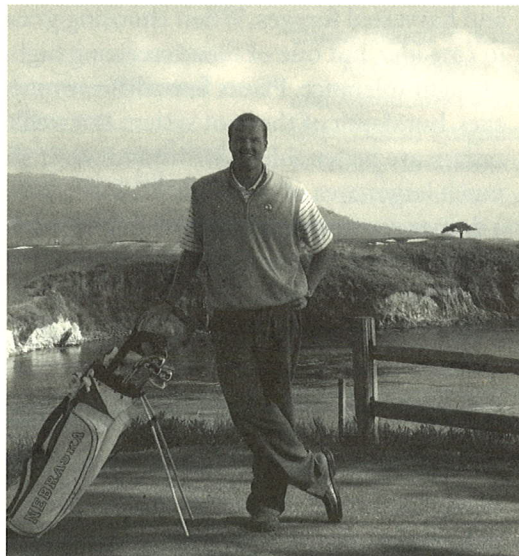
On internships:

I have had the great fortune to be able to work at some of the best golf courses in the country. My first internship was at Interlachen Country Club in Edina, MN. Last summer I was at Hazeltine National Golf Club in Chaska, MN, and I spent this summer at Pebble Beach Golf Links in CA. Working at Pebble Beach was truly a dream come true. You watch Pebble on TV and you don't think any of it is real, and then you actually see it, then play it. Responsibilities included providing world-class service to the guests, working in the golf shop, and helping out in every area of the golf operation including tournaments, practice facility management, golf car management, starting groups on the first tee, as well as doing extra events like night golf and putting contests for corporate groups.

On being a Teaching Assistant:

In August, 2011 I was hired to be the Teaching Assistant for the PGA Golf Management program. I assist with the PGAM classes as well as tournaments. Now that I am a senior, I feel my

role includes being more like a mentor to the younger students because I have been in their shoes and I can give them advice on internships and classes. I also have the role as Assistant Tournament Director. This is one of my favorite things because I get the chance to make custom calligraphy scoreboards as well as scorecards for the tournaments. We have about 15 tournaments each semester, which is a great opportunity to showcase your golf game as well as get to know the other students.



Nick Sage poses for a photo during his Summer 2012 PGA Golf Management internship at Pebble Beach Golf Links.

On getting involved:

When I was a freshman at UNL, I got involved by volunteering for golf events for the program. We have so many opportunities to volunteer for events like the Special Olympics as well as Nebraska PGA events. The way I got really involved was getting out and meeting people. It sounds cliché, but that is what you have to do in college. I wanted to meet as many people as I could; the more I got to know the upper classmen in the program, the more I felt comfortable volunteering and doing extra things for the program. This eventually led me into the TA job.

What I have learned:

I have learned so much at UNL. One of the best decisions of my life was to attend UNL and major in PGA Golf Management. UNL has given me

the opportunity to work at some of the best golf courses in the world. I have met some of my best friends here and made lifelong connections. I have learned not to be afraid, and to get out of my comfort zone and try new things.

(continued on page 3)

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The Center for Grassland Studies is a unit within the University of Nebraska–Lincoln Institute of Agriculture and Natural Resources. It receives guidance from a Policy Advisory Committee and a Citizens Advisory Council.

Note: Opinions expressed in this newsletter are those of the authors and do not necessarily represent the policy of the Center for Grassland Studies, the Institute of Agriculture and Natural Resources or the University of Nebraska.



Martin A. MassengaleCGS Director
Pam Murray..... Newsletter Editor
Anne Moore Newsletter Layout



FROM THE DIRECTOR

We have read and heard much from the media in recent months about the drought now in progress throughout much of the United States. The midwestern states and especially Nebraska have experienced some of the most serious drought conditions. Several knowledgeable people have indicated that this appears to be the most severe drought that Nebraska has had in the last 50 years.

Drought occurs when there is an extended period with not enough water to carry out the life processes of plants and animals in a normal manner. Drought in Nebraska not only affects this state, but surrounding states, the nation and even the world because we export a significant amount of food and other agricultural products. Essentially all segments of our economy are affected by drought, but especially the agricultural economy. Shortages of water over an extended period of time will have a significant impact on food, bioenergy and animal production.

Drought places considerable stress on grasses as well as other plants and animals. One needs to remember this fact when selecting, seeding and managing grasses for lawns, golf courses and other turf areas as well as pastures, rangelands and harvested forages. When choosing grasses for planting, one has many traits to consider, but one of those receiving high consideration on nonirrigated areas is drought tolerance. Plants have different mechanisms for coping with water shortages, but depth of the root system is a wellknown one. Grasses with a deep root system are better able to withstand water shortages because their roots penetrate a much larger area of soil than shallow rooted grasses. Native grasses generally have a deeper root system than introduced species because they have evolved over years of enduring different cycles of heat and drought, and only the better adapted ones survived. Some plants also carry genes that enable them to metabolize water with greater efficiency than others, which makes them better able to withstand drought. Others are able to roll or curl their leaves, which reduces transpiration and water loss. These are just a few examples of how some plants are able to cope with water shortages.

Managing grasses during drought conditions is another important consideration. Continued removal of foliage, especially to short heights, will place additional stress on the plants. Grasses should not be clipped or grazed as short under drought condition as they would be under normal growing conditions. Also, grasses need to have a longer period of time between removal of the foliage during drought to manufacture and store food reserves. In the northern states where the winters are cold and sometimes long, it is important for the plants to be in good condition going into winter. The fall season is a prime time to prepare plants for winter. Consideration of these kinds of factors before making selections for specific grasses to plant can be highly beneficial if and when we experience droughts again in the future.

M. A. Massengale

Meet Our Two Students *(continued from page 1)*

Joelle Pillen, Senior in Grazing Livestock Systems

"You may now present your opening argument." That's a phrase Joelle Pillen heard as she began one of the many high school activities in which she participated. She was a senior lawyer in the Mock Trial Club at Lakeview High School in Columbus, NE. The National Honor Society student learned a lot about conducting background research, exploring options, interviewing people, and "making a case"... skills that all come in handy when making choices about college, majors and careers.

She had been on the UNL campus several times for events such as FFA contests, and really felt comfortable here where she observed that people were open, friendly, and seemed to know each other. She "interviewed" faculty at the schools under consideration and noted how well the UNL researchers were known in the agricultural industry. Adding that to the facts that she loved the campus and it was close to home, she "made the case" to herself that the College of Agricultural Sciences and Natural Resources offered the most competitive agricultural program and was the best fit for her educational and career goals. She entered UNL as an Animal Science major, and added Grazing Livestock Systems her sophomore year.

Joelle's family farm in Platte Center consists of a small feedlot, a cow-calf operation (her favorite part) and crops. When she wanted exposure to different types of farming/ranching situations for her internships, she headed west. The first internship was at a large (61,000 head) feedlot in Lamar, CO. She conducted her GLS internship this past summer in the Sandhills at the Arrowhead Ranch of Rosemary and Kevin Anderson in Whitman, NE.



Like a lawyer, Joelle Pillen collected facts, interviewed people, and explored options before concluding that the dual bachelor's degrees in Grazing Livestock Systems and Animal Science would fit her educational and career goals.

"The structure of the GLS internship is one of the reasons I added the major," Joelle said. "I liked that students set goals, develop a project, and report on the internship at the GLS Internship Symposium," she added.

At the Arrowhead Ranch, she greatly increased her knowledge about range plants, intensive rotation grazing systems, and handling both cattle and horses. "Kevin taught me a lot about low-stress, gentle handling of cattle. And while I'd been riding horses all my life, I learned even more from him about that and roping."

Joelle said she has always been fascinated with forages and feedstuffs. Not surprisingly, her favorite classes so far were Forage Crop & Range Management and Cow Calf Management. "On our farm we would move cattle from this pasture to another, and then another, but I didn't know why because I didn't understand about things like the nutritional value of the various grasses at different stages of growth. My classes and internships are helping me know the 'why' of what we do." She has also particularly enjoyed organic chemistry and classes related to animal physiology and reproduction.

At UNL Joelle has participated in the Block & Bridle, Rodeo and Agronomy Clubs, the Dean's Scholars in Experiential Leadership (DSEL) Program, and the William H. Thompson Scholars Learning Community.

Careers under consideration are beef nutritionist or manager of a large ranch or moderate-sized feedlot. As a member of her high school Language Club, Joelle traveled to Europe for three weeks. Chances are, whatever path she follows after graduation, it is likely to lead to somewhere a bit closer to home!

CGS Associates

For his "pioneering and innovative research relevant to the nutrition of animals that benefits mankind and the nutritional value of foods from animals," **Terry Klopfenstein** received the American Feed Industry Association's New Frontiers in Animal Nutrition Award from the Federation of Animal Science Societies at the annual meeting of the American Society of Animal Science in July. He also recently received the Cattle Feeders Hall of Fame Industry Leadership Award, which goes to advocates "who have demonstrated outstanding leadership, provided exemplary service and have made significant contributions to the advancement of the cattlefeeding business."

Chuck Francis received the Crop Science Teaching Award from the Crop Science Society of America at the association's annual meeting in October.

Info Tuft



Our ancestors ate grass earlier than previously thought. According to a recent study published in the *Proceedings of the National Academy of Sciences*, early hominins living 3 to 3.5 million years ago obtained more than half of their nutrition from grasses.

That's about half a million years earlier than previous research had indicated. Read more at www.newscientist.com/article/dn22494humansdinedongrass35millionyearsago.html.

CGS Citizens Advisory Council Members and Associates Tour ARDC

Jackets, hats and gloves were the order of the day on the cold and windy October 19 Friday when members of the Center for Grassland Studies Citizens Advisory Council and Center Associates toured the Agricultural Research and Development Center (ARDC) near Mead, NE. Nine Associates gave presentations (some from the bus as we parked by their research sites) about the research they are conducting. The following summaries of their talks will give the reader an idea of the scope of grassland-related research being carried out at the ARDC. If you would like more information about any of the below projects, please contact the Center for Grassland Studies.

Burning and mowing practices with native grasses

Jim Stubbendieck, Professor Emeritus, Dept. of Agronomy and Horticulture, UNL

Tom Bragg, Professor, Dept. of Biology, UNO



UNO biologist Tom Bragg (speaking) and UNL ecologist Jim Stubbendieck (standing) described their long-term (since 1981) research to assess the effects of fire and mowing treatments over time.

This long-term research area was established in 1981 on a site that had been seeded in 1964 to a mix of big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), sideoats grama (*Bouteloua curtipendula*), and sand lovegrass (*Eragrostis trichoides*). The area had been hayed until 1980 when, in 1981, we initiated our research on the

area. The particular intent was to establish a long-term site in order to assess the effects of fire and mowing treatments over enough time to include long-term environmental variables, particularly weather conditions (e.g., wet and dry years). Plots were 0.1 ha in size (33 by 33 m) with a 3-meter buffer strip. All plots were evaluated in 1981, with fire and mowing treatments being initiated the following year. Step-point sampling has been conducted each year of the study, with canopy cover evaluations generally conducted every third (year before the quadrennial treatments) and fourth (year after the quadrennial treatment) years. Fire was used to replicate the historic fire conditions; annual and quadrennial fire treatments were believed to approximate the historic range of fire frequency. Mowing was included because the difficulty in applying fire in urban areas often limits its use in grassland management, thus the need to demonstrate the impact of this alternate treatment. Treatments have been continuous since 1982. Allwine Prairie Preserve, in the vicinity of Omaha, NE, provides a replicate site with mostly similar treatments.

Details about the above, ongoing study:

Experimental Design: Randomized Complete Block

- a. 3 Replications (Blocks)
- b. Slope and Soil Type

Treatment Design: 3 x 4 Factorial

- a. Season (Spring, Summer, Fall)
- b. Disturbance Regime:
 - Annual Burn (Spring, Summer, Fall)
 - Quadrennial Burn (Spring, Summer, Fall)
 - Annual Mulch Mow (Spring, Summer, Fall)

- Quadrennial Mulch Mow (Spring, Summer, and Fall)
- Untreated (neither burned nor mulch-mowed; woody plants removed)

Turf projects

Zac Reicher, Dept. of Agronomy and Horticulture, UNL

Seeding into preemergence herbicides?

- This is a frequent question we get in spring after mistaken applications.
- PRE's are a critical tool for annual bluegrass control in golf turf.
- New and more accurate tools are available for inter-seeding.
- Methods:
 - Herbicides applied 4, 2, and 0 weeks prior to overseeding
 - Kentucky bluegrass, tall fescue, creeping bentgrass or perennial ryegrass inter-seeded
 - Will rate establishment and weed cover for 12 months
 - Repeated at Lochland Country Club in Hastings



The tour included a site where Zac Reicher (second from left), who specializes in turfgrass management, discussed seeding research he and others are doing on turf plots at the ARDC.

Optimizing ratio of Kentucky bluegrass to perennial ryegrass on fairways:

- Kentucky bluegrass (KBG) is slow to germinate and establish, yet is the best adapted fairway grass for much of the northern Great Plains.
- Perennial ryegrass (PRYE) germinates and establishes quickly, but is susceptible to many diseases and winterkill on golf course fairways.
- Most golf courses are forced to seed PRYE to repair summer-damaged fairways.
- Methods:
 - Six KBG:PRYE ratios were seeded in early September
 - Three herbicide strategies to control annual bluegrass were applied this fall
 - KBG/PRYE/Annual bluegrass covers recorded for 12 months
 - Repeated at Lochland Country Club in Hastings

Legume pastures, brome pastures, and brome supplemented with byproducts

Terry Klopfenstein & Jim MacDonald, Dept. of Animal Science, UNL

John Guretzky, Dept. of Agronomy and Horticulture, UNL (Note: Bruce Anderson and Walter Schacht in the Dept. of Agronomy and Horticulture are also critical faculty on this research, but were unable to be present today)

Over the last three years, we have evaluated effects of nitrogen fertilization and byproduct supplementation on smooth brome-grass pastures. Our approach has been to investigate effects of management on pasture species composition and litter dynamics to assess sustainability of these systems from a vegetation and soils perspective. The research has found that nitrogen fertilization and supplementation of corn dried distillers grains plus



The group got out of the wind and into the "I-Barn" (with Individual feeding stalls) to listen to UNL animal scientists Terry Klopfenstein (left) and Jim MacDonald (center) talk about projects involving byproduct supplementation of animals grazing brome and/or corn stalks, while Tom Bragg looks on.

solubles (DDGS) to beef cattle grazing unfertilized smooth brome grass pastures has had limited effects on litter production and chemical composition relative to beef cattle grazing unfertilized pastures. Presence of fox-tail species, annual graminoids, and annual plants as a whole, however, have been found in decreasing amounts from unfertilized control pastures to unfertilized, byproduct supplemented pastures, to nitrogen fertilized

removal include the potential for increased wind and water erosion, increased compaction associated with additional traffic to bale and remove the stover, loss of nutrients, and decrease in soil organic matter. It is well known that as stover remaining after harvest increases, soil cover increases and the potential for erosion declines. It is also clear that in high production corn systems, large amounts of stover can lower yields due to poor stand establishment and cooler spring soil temperatures. While results are site specific, there is potential for removing a portion of the stover for other uses in no-tillage systems without negatively affecting soil quality. Grazing by livestock is a practice that utilizes a portion of the stover and reduces some of the concerns associated with stover removal. We are analyzing soil samples collected from this long-term study to assess the effect of stover grazing, to suggest future research needs, and begin to formulate grazing intensity recommendations for these systems. This information will be of interest to the livestock industry, corn growers, and conservation agencies.



USDA researcher Brian Wienhold is working with UNL agronomists and animal scientists to evaluate the effects on soil of grazing corn residue.

pastures. Thus, application of N fertilizer in spring at 80 lb/acre provides resistance to annuals in pastures, while increasing herbage production by 55% relative to unfertilized pastures. Supplementation of corn DDGS on unfertilized pastures, however, improves beef cattle weight gains, production, and N use efficiency relative to unsupplemented cattle on fertilized and unfertilized pastures while providing an intermediate level of resistance to annual weeds.

Brome responds to N fertilization but N fertilizer has become expensive. Distillers grains supplementation supplies protein and energy to yearlings that replaces some grass, increases gains and supplies N to the brome through N excretion in the urine and feces. We have eight years of data for yearlings grazing unfertilized brome, fertilized brome and unfertilized brome supplemented with distillers grains in pastures 11, 12 and 13. The steers gained the same on unfertilized brome as on fertilized, but needed 50% more acres. Distillers grains supplemented steers gained 0.61 lb/d more than the unsupplemented steers, and profit increased by \$38. Economics depend on price of grass, fertilizer and distillers grains.

Regarding the 2012 grass/grass-legume study, we were able to get about 75 extra days (about 200 lbs of extra weight gain) on each smooth brome grass-legume pasture as compared to a fertilized smooth brome grass pasture. As we do in pastures 11, 12, and 13, we graze to an end-of-season residue of 1000 to 1200 lbs/acre. The forage production on the two pasture types were similar from the beginning of the growing season to June 5 (when we clipped), but we don't have an estimate of forage production for the remainder of the growing season. We didn't do the fall clipping in the cages until recently and we don't have samples dried, weighed, and entered yet. I expect that the summer legume production was relatively high (compared to the grass) and that the extra days of grazing in the grass-legume pastures were a result of the legumes. The legumes are red clover, alfalfa, and birdsfoot trefoil.

Removal of corn residue by grazing and other means

Terry Klopfenstein, Dept. of Animal Science, UNL
Brian Wienhold, USDA Agricultural Research Service

When the Great Plains area was settled, agronomic practices that were available resulted in significant loss of soil organic matter. Over time, conservation practices were developed that slowed the loss, and in many cases, increased soil organic matter. Stover removal represents a major change in agriculture, and there are concerns about the impact this practice will have on soil quality and future productivity. Major concerns associated with stover

removal include the potential for increased wind and water erosion, increased compaction associated with additional traffic to bale and remove the stover, loss of nutrients, and decrease in soil organic matter. It is well known that as stover remaining after harvest increases, soil cover increases and the potential for erosion declines. It is also clear that in high production corn systems, large amounts of stover can lower yields due to poor stand establishment and cooler spring soil temperatures. While results are site specific, there is potential for removing a portion of the stover for other uses in no-tillage systems without negatively affecting soil quality. Grazing by livestock is a practice that utilizes a portion of the stover and reduces some of the concerns associated with stover removal. We are analyzing soil samples collected from this long-term study to assess the effect of stover grazing, to suggest future research needs, and begin to formulate grazing intensity recommendations for these systems. This information will be of interest to the livestock industry, corn growers, and conservation agencies.

In Nebraska, we produce about 42 million tons of corn residue annually. Using only 3 million tons of that residue would help the cattle industry survive and grow in the current situation where pasture has been converted to corn. Cattle select husks and leaves when grazing stalk fields and consume about 8 lb per bushel of corn produced. Fifteen years of data show that soybean yields the year after grazing are increased by grazing.

Forage for Cows. Pasture and hay land has been converted to crop production (corn and beans). Corn residue is a good replacement forage but needs to fit economically into beef production systems. Twenty to 30% wet distillers grains (dry matter basis) provides protein, energy, phosphorus and palatability with corn residue to provide cattle performance equivalent to pasture. We have two research programs designed to look at the feasibility of keeping cows in confinement or supplementing them while grazing.

Pasture and bioenergy

Ken Vogel & Rob Mitchell, USDA Agricultural Research Service

The first stop focused on current grazing research evaluating the livestock production potential of perennial cool- and warm-season grasses. The cool-season grass pastures were seeded to 'Lincoln' smooth brome grass (the most widely grown brome grass cultivar in the Midwest), a smooth brome grass experimental strain bred for increased yield and digestibility, and an experimental of meadow brome strain bred for improved disease resistance and digestibility. Pastures were seeded in 2009, hayed in 2010, grazed for 31 days in 2011, and grazed for 37 days in 2012. Average body weight (BW) gain per acre averaged for 2011 and 2012 was 276 lb for Lincoln smooth brome grass, 321 lb for the improved smooth brome grass strain, and 290 lb for the meadow brome strain. Grazing will continue in 2013. We are comparing warm-season grass pastures seeded to monocultures of big

(continued on page 8)

Nebraska Grazing Conference Continues to Fulfill Needs

Close to 200 people and 22 exhibitors participated in the 12th annual Nebraska Grazing Conference held August 14-15, 2012 in Kearney. From the following comments on the evaluation forms, it is clear that the event continues to meet the information and networking needs of those involved in the grazing industry.

On the two presentations by Kathy Voth who spoke on training cows to eat weeds:

Super presenter; valuable info.

Best talk of the entire program!

Probably one of the most useful things I learned about this year.

Very unique presentation. One of the best presentations I've seen!

It was worth coming to the conference just for her presentation. She thinks outside the box. We all need to be more receptive to new ideas.

Here's a researcher [Pat Reece] that used numbers from past and put usable language to it to be practically followed!

[Kansas rancher Ted Alexander did an] excellent job of discussing both principles and concrete examples of application of the principles. He is an experienced producer who provided valuable insights.

Best part of program is the ranchers themselves!

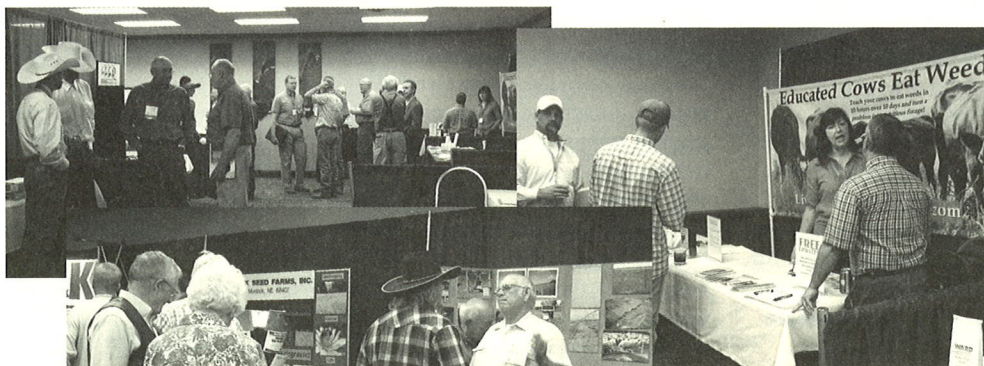
The speakers were excellent, to the point; personal experiences very helpful; thank you.

Great conference; really pertinent for our year.

Very nice variety, good themes, good mix of science and management.

First time attending; I'm from KS, will recommend that my fellow NRCSers attend in 2013.

Outstanding Wed. AM session to address the acute concern of drought.



Conference goers enjoy interacting with company and organization reps at their exhibit booths.



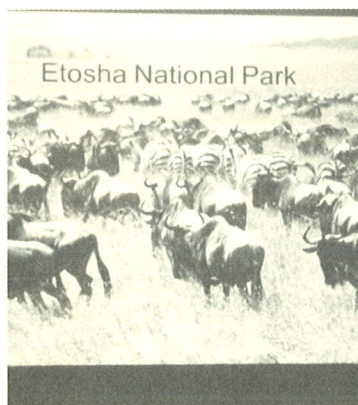
Each year conference participants hear from the previous year's winner of the Nebraska Leopold Conservation Award. This year Beau Mathewson represented his family's operation in Potter, NE.



In an entertaining and engaging manner, Kathy Voth, founder of Livestock for Landscapes based in Loveland, CO, talked to the audience in a day presentation and evening workshop about training cows to eat weeds.



Bassett rancher Chad Buell answers a question from the audience while fellow presenters in the land monitoring session, Bill Vodehnal (left) with Nebraska Game and Parks Commission and Rod Christen from Steinauer, look on.



After a delicious steak dinner, the group heard a presentation by range scientist Walter Schacht, who described the similarities and differences of grazing animals in Namibia, Southern Africa (where he spent nearly all of 2011) compared to the Great Plains.



Excellent content; superb choice of speakers and topics.

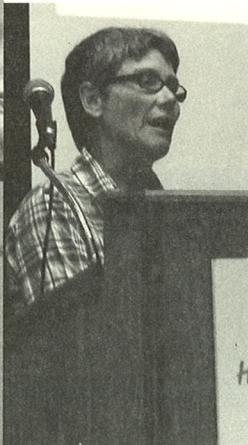
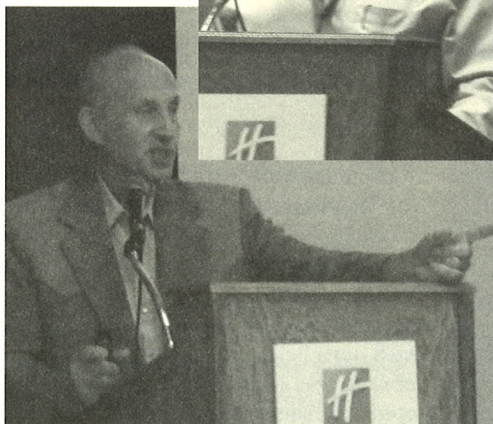
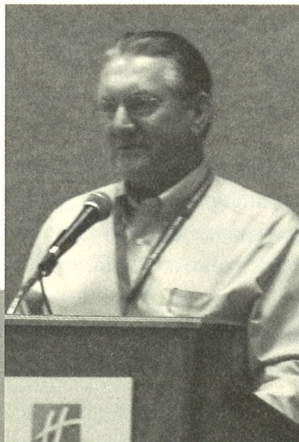
Useful program and timely again this year; thanks for doing info on drought this year!

Excellent program, very relevant to producers, a lot of take-home information they can utilize immediately on their ranch.

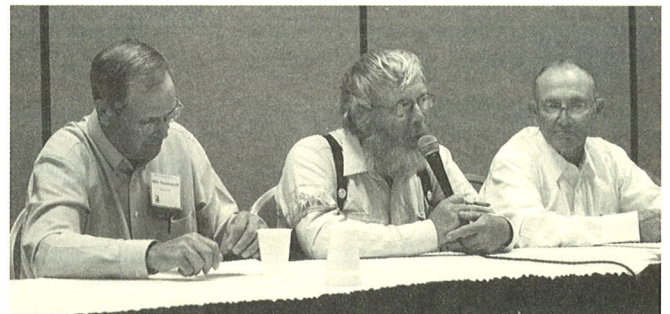
Proceedings from the 2012 and previous conferences are still available for purchase; they contain the material submitted by the presenters prior to the conferences. The conference website (nebraskagrazingconference.unl.edu) contains the list of speakers and topics for each conference and information on how to order proceedings.

If you have not attended previous conferences but would like to be on the mailing list to receive notice of the next conference, to be held in the same location on August 13-14, 2013, simply send your name and address to the CGS office. Details of the 2013 program will be posted on the conference website as they become available early next year.

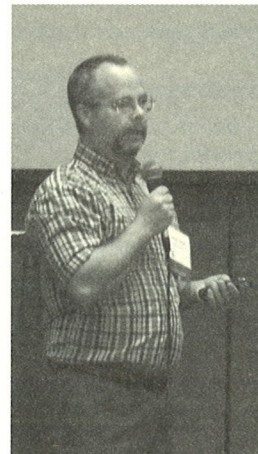
The Nebraska Grazing Conference has several sponsors including this year's conference underwriters: Center for Grassland Studies, Nebraska Game and Parks Commission, Nebraska Grazing Lands Coalition, and Farm Credit Services of America.



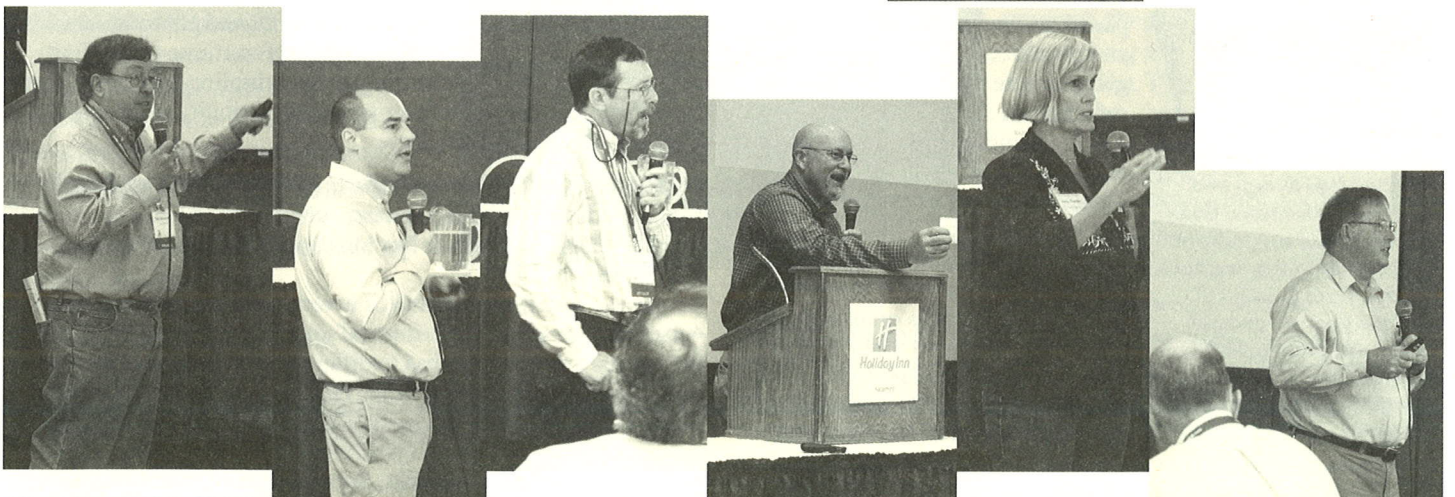
Animal scientist Terry Klopfenstein (pointing) and graziers Al Svajgr from Cozad and Nancy Peterson (also a veterinarian) from Gordon presented information in the winter grazing session.



Evaluating grazing system options was the topic addressed by a panel of producers: (from left) John Ravenscroft; Nenzel; Lynn Myers, Lewellen; and Harry Merrihew, Ashby.



Sandy Smart, professor of rangeland ecology at South Dakota State University, discussed using prescribed fire and grazing to manage for biodiversity and livestock production.

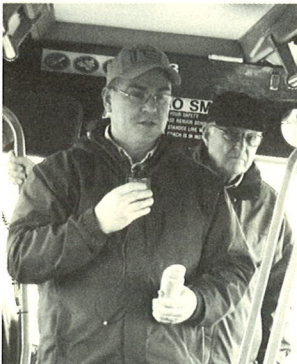


The entire morning of the second day was devoted to the timely topic of drought. From left: Ted Alexander, rancher from Sun City, KS; Cody Knutson, UNL; Rick Rasby, UNL; Pat Reece, Prairie & Montane Enterprises, Gering, NE; Amy Roeder, USDA; Matt Stockton, UNL.

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Address Service Requested

CGS Citizens Advisory *(continued from page 4)*



USDA scientists Rob Mitchell (speaking) and Ken Vogel discussed two grass-related projects: one on evaluating the livestock production potential of various pasture grasses and another on evaluating bioenergy feedstocks on marginally-productive cropland.

bluestem, indiangrass, and switchgrass and in two mixtures (Mixture 1 = big bluestem + indiangrass + sideoats grama; Mixture 2 = big bluestem + indiangrass + switchgrass + sideoats grama). Pastures were seeded with cultivars bred for increased yield and IVDMD. The pastures were seeded in June 2011 and grazed in 2012. Average BW gain per acre in 2012 was 256 lb for switchgrass, 320 lb for big bluestem, 318 lb for indiangrass, 294 lb for Mixture 1, and 346 lb for Mixture 2. The pastures will be grazed again in 2013 and 2014.

The second stop discussed the field-scale evaluation of candidate bioenergy feedstocks on marginally-productive cropland. Feedstocks at this site include dryland corn, a bioenergy switchgrass strain (scheduled for release in 2013), big bluestem,

and a low-diversity mixture comprised of big bluestem, indiangrass, and sideoats grama — all seeded in April 2012. Drought reduced plant growth and yield, but corn grain yield averaged 102 bushels/acre, even though April through August precipitation was

more than 9" below the long-term average. A target of 50% of the stover was removed from each corn field and averaged 1.4 tons/acre. A winter triticale cover crop was planted on half of each field after stover removal and acceptable stands have established. For the perennial grass fields, stands are excellent and averaged 84% for bioenergy switchgrass, 68% for big bluestem, and 60% for the low-diversity mixture. Dry matter yield estimates for the fields harvested after frost in October were 3.4 tons/acre for bioenergy switchgrass, 1.2 tons/acre for big bluestem, and 1.9 tons/acre for the low-diversity mixture. This study will continue through at least 2016 and includes greenhouse gas sampling and soil carbon analysis to determine the long-term sustainability of managing these feedstocks for bioenergy.

Byproduct supplementation of individual animals grazing brome and/or corn stalks

Terry Klopfenstein & Jim MacDonald, Dept. of Animal Science, UNL

In our nutrition research, it is very useful to have the individual animal as our experimental unit. Because we are studying the animal and the response to different supplements, the animals can all graze a common pasture. This is in contrast to research where we are studying the pasture and therefore need replicated pastures. Clearly, calves and yearlings respond to distillers grains on both brome and cornstalks. Supplementing individual animals allows us to develop a response curve which will aid us in determining optimum supplementation levels.