Summer 2008

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Center for Grassland Studies

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Are the Sandhills Fragile?

by James Stubbendieck and Susan J. Tunnell, Department of Agronomy and Horticulture, UNL

Media stories often predict a dire future for the Nebraska Sandhills based on their potential fragility in response to drought and climate change. It's commonly believed that even a small disturbance of the vegetation of the Sandhills will result in active wind erosion, causing the dune to begin to move. Is there evidence for such predictions?

Most range research is short-term, directed to specific objectives. As such, it often doesn't detect vegetation changes that occur over periods of varying precipitation and grazing pressure. Therefore, it doesn't quantify vegetation changes that could define the fragility of the Sandhills. We document vegetation change in the Sandhills using data collected since 1926 and test the vegetation to determine if it is fragile.

Research on the first and largest hand-planted forest in the United States provides some answers to our question. The forest was established early in the 20th century at the Bessey Ranger District, near Halsey in the Sandhills. In an effort to protect portions of the forest, planners included a firebreak in the forest design. Called the "strip allotment," the firebreak (1 mile wide and 3 miles long) was positioned between sections of the forest. To reduce the amount of fine fuel available, it was heavily grazed to shift plant community dominance from little bluestem to hairy grama.

In 1926, the United States Forest Service (USFS) awarded a contract to Raymond Pool, professor of botany at the University of Nebraska, to conduct a 10-year evaluation of the plant community of the strip allotment in response to heavy grazing. He established permanent plots, each marked with an iron well pipe driven to 2 to 4 inches above the soil surface. Pool sampled the vegetation in 1926, 1927, 1929, and 1931. The project was terminated in 1931 by the USFS because of the start of the severe drought of the 1930s. But Pool sampled the plots in 1938 to determine the impact of the drought on the plant community. USFS collected data from the plots in 1944 and we have collected data from the plots annually since 1979.

Annual precipitation averages about 21 inches, with most occurring from April to October. The native plant community is comprised of tallgrass and mixed-grass prairie species. Dominant grasses include sand bluestem, little bluestem, prairie sandreed, hairy grama, and needleandthread. Numerous forbs and shrubs contribute to the diversity of this grassland, including western ragweed, heath aster, cudweed sagewort, leadplant, wild rose, western sandcherry, and New Jersey tea.

We used Detrended Correspondence Analysis, a statistical technique, to evaluate long-term changes in species frequencies. Because most species decreased during the drought period from 1931 to 1938, we assumed that precipitation was the primary

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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 50-member Citizens Advisory Council. This newsletter is published quarterly.

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. Massengale .....CGS Director
Pam Murray.....CGS Coordinator
Jan Shamburg..... CGS Secretary
Anne Moore ..... Newsletter Layout

From the Director

In recent weeks, we have seen the price of oil increase to over $140 per barrel, which has caused a significant increase in price in many other sectors of our economy. Our society has become heavily dependent upon energy, but to blame the production of ethanol produced from corn, a grass plant, for price increases on numerous other parts of our economy is not supported by the facts. Richard Perrin, an agricultural economist here at the University of Nebraska, concluded from a recent study that ethanol produced from corn was responsible for only about 1% of the increase in food prices within the United States over the past two years. However, he did conclude that its impact on global food prices was higher, perhaps as much as 15%, in developing countries because their diet is more grain based.

Biofuels are helping address both environmental concerns and the economic impacts of high oil prices. Also, increasing the acres of grasslands in the agricultural system improves the sustainability of the entire process. Cellulosic ethanol, as opposed to ethanol produced from corn, should provide better energy returns, have less environmental impacts, and cause less disruptions in the feed and food supplies. Agricultural scientists are well prepared for developing cultivars specific for biofuel production, growing these cultivars for maximum biomass production, and improving processing technology.

The production of renewable fuels from grasses will help to supplement the energy supply, but for this to play a more significant role in our energy supply, we must find and commercialize an efficient and cost effective way to convert cellulosic materials to alcohol.

There are many abundant feedstocks available for use in converting cellulosic materials to alcohol. However, Ken Vogel, agronomist and plant breeder with the Agricultural Research Service of the United States Department of Agriculture located at the University of Nebraska, conducted a number of trials throughout the upper Great Plains and midwestern states and identified switchgrass, a native warm-season perennial prairiegrass, as the most promising species for development into a biomass fuel crop. Vogel and his colleagues pointed out that switchgrass has many desirable attributes, including broad adaptation, high yields, stress tolerance and is harvestable by conventional haymaking equipment. Switchgrass appears to be particularly good at producing high yields on marginal land that is not suitable for row crop production because of significant erosion problems.

The previous two issues of this newsletter carried articles related to research on ethanol made from biomass conducted by Perrin, Vogel and others.

There will be a place for ethanol produced both from corn starch and cellulosic materials far into the future.

M. A. Massengale

Forage Triticale (X *Triticosecale* Wittmack) Genotypes for the Northern Great Plains

by Lekgari Lekgari and P. Stephen Baenziger, Department of Agronomy and Horticulture, UNL

What is Triticale?

Triticale (X *Triticosecale* Wittmack) is a human-made crop that is a cross between durum wheat and rye. The crop is genetically stable and does not revert to rye or durum wheat. It is a multi-purpose crop that is mainly used as a forage crop in the northern Great Plains. In addition to being used as a forage crop, triticale can be used as a winter cover and green manure crop, especially in areas vulnerable to erosion or where the summer annual crop and stover are harvested, such as might occur in future biofuel cropping systems. Triticale can also be used as a grain crop for feed or to make flour for use in different products like cookies. Its flexible uses and winter annual characteristics make it an exciting new crop for the upper Great Plains.

Triticale as a Forage Crop

Currently most triticale in Nebraska is used as a forage crop in areas of cattle production. The use of winter triticale, with its early-late spring forage potential, will help extend the grazing season for a period when there is limited forage quantity and quality. However, current triticale cultivars are either high grain yielding with poor forage yield or excellent in forage yield but poor for grain yield; therefore, the higher cost of seed for forage triticale production is an economic impediment to using triticale as a forage crop. The problem of seed cost could be overcome by: 1) developing forage cultivars with a reasonable grain yield, 2) blending forage and grain types, or 3) through other agronomic practices like optimum seeding rates. It is important to carefully select cultivars that will achieve high forage yield and quality in late fall or early spring when additional feed is most valuable to reduce feed costs or to extend the forage period. Forage cultivars also need to be selected for high biomass yield and digestibility, as these will increase livestock performance and profitability.

Improving Triticale for Economical Forage Production

The objectives of these studies were to: 1) identify and select triticale strains suited for late fall and spring forage and grain production in the Northern Great Plains, and 2) determine optimum blending proportion and seeding rates.

We had three experiments to address our objectives. The first two experiments consisted of 26 experimental triticale strains, three released triticale cultivars and one wheat cultivar, for comparison (winter wheat is the primary winter cereal grown in the U.S.). These two experiments were to assess the strains for both forage yield and quality, and grain yield. The two experiments were necessary because measurement of forage yield and quality is a destructive procedure, so we needed a second experiment to assess grain yield at maturity. In the third experiment we used

Triticale heads in the greenhouse. Triticale is planted and harvested like most small grains and is closest in appearance to winter wheat.

two released modern Nebraska cultivars, NE422T (a forage type cultivar) and NE426GT (a high yielding grain and early spring forage type cultivar) to make three blends based on percentage seed weight (making five treatments). The blends were: Blend 1 (60% NE422T:40% NE426GT), Blend 2 (70% NE422T:30% NE426GT), and Blend 3 (80% NE422T:20% NE426GT). Experiment 3 also evaluated three seeding rates (68, 103, and 137 lbs/a). The first and third experiments measured forage yield and the quality parameters, which included protein concentration and *in-vitro* dry matter digestibility (IVDMD), and were harvested at soft-dough stage when all the plots had headed. The experiments were planted at Mead and Sidney, NE for two seasons (2003/04 and 2004/05).

What We Discovered about Triticale

Forage yields ranged from 7500 to 9000 lbs/a for the triticale strains, while grain yield ranged from 2300 to 3830 lbs/a. The later flowering lines were lower in grain yield, but not necessarily lower in forage yield when compared to the early flowering ones. Later maturing lines are more desirable due to their potential to provide forage in the late spring. There were three experimental strains among the top ten entries for both forage and grain yield; hence, progress toward developing cultivars with both good grain and forage production potential has been made, meeting our first objective. The results also indicated that some of the grain type strains have good potential to provide forage in early spring. Trical, one of the oldest triticale cultivars, was among the lowest three lines for forage and grain yield (7500 lbs/a and 2300 lbs/a,

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respectively), indicating progress had been made in triticale improvement over the past 20 years. Grain yield differences between years were more evident at Sidney than at Mead. For example, the 2004/05 grain yields at Sidney (3270 lbs/a) were less than those of 2003/04 at Sidney (3780 lbs/a). Mead produced more forage yield in 2003/04 (10130 lbs/a) than Sidney (6440 lbs/a), with the 2004/05 season having more forage yield at both locations (7324 lbs/a at Sidney and 11268 lbs/a at Mead).

The experiments also showed that seasons and locations had different effects on forage quality of triticale strains. However, all evaluated lines had relatively good forage quality as shown by high protein (average ≥ 8%) and IVDMD. Those lines that had IVDMD of over 65% and protein concentration ranging from 8 to 9% (24 lines) could supply the required (50%) total digestible nutrients (TDN) for average daily gains of ≥ 0.7 lbs. The relative feed value (RFV), which is used to estimate the value of forage, ranged from 91.0 to 102.7, which is grade 4 or above. This RFV would be suitable for maintenance of beef or dry dairy cows. These results agree with several previous studies that showed triticale has good nutrient composition to support most livestock. In general, the environment had little effect on the quality rankings of the triticale strains, though the environment had a major effect on forage quality.

The Effect of Seeding Rates

The effect of seeding rates was observed at both locations, especially on forage yield. However, seeding rate had little or no effect on the quality performance of the blends. The 68 lbs/a seeding rate produced significantly less forage yield at Mead (9200 lbs/a) than did the 103 and 137 lbs/a rates (10100 and 10200 lbs/a, respectively). The latter two seeding rates were not significantly different, suggesting that further increases in seeding rate would have little impact on forage yield, though perhaps a lower seeding rate than 103 lbs/a could be used. At Sidney, forage yield was lower at the 103 lbs/a seeding rate (7000 lbs/a), being inexplicably smaller than the 68 and 137 lbs/a (both were 7500 lbs/a); hence, the lower seeding rate should be used in this location.

The Effects of Blends

At Mead, Blend 2 (70% NE422T:30% NE426GT) produced the greatest forage yield of 9580, 9980, and 10550 lbs/a at seeding rates of 68, 103, and 137 lbs/a, respectively, which was similar to forage yield of NE422T. At Sidney, Blend 1 (60% NE422T:40% NE426GT) had the greatest forage yield of 8000, 7100, and 7300 lbs/a – greater than NE422T, which had lower forage yield at the two lower seeding rates (7030, 6610, and 7460 lbs/a at 68, 103, and 137 seeding rates, respectively). Even though Blend 2 and Blend 1 had greater forage yield (not significantly different from the highest yielding cultivar) at Mead and Sidney, respectively, the observed blend means were not significantly different from the expected means (the weighted average of the cultivar means) for any comparison. At Sidney, all the observed values were above the expected mean values, which may indicate that the blending of cultivars at Sidney was beneficial and had a small positive effect, whereas at Mead, the observed blend mean randomly varied around the expected blend means. Blending the two cultivars had little effect on forage quality because both cultivars have relatively good forage quality.

Summary

Triticale improvement continues to advance as new triticale strains are being identified and developed. This study has shown that there are new triticale strains that can perform similarly or better than the best currently available cultivars for both grain and forage production and quality. Agronomic practices are also important to get the best productivity; therefore, practices that can easily be manipulated by producers, e.g., seeding rates and genotype blending in order to reduce the costs associated with purchased seed, need to be exploited. Seeding rate has been shown to have little or no effect on the quality of forages, but affected the forage yield depending on the environment (most likely due to annual moisture). Lower seeding rates are preferred in low moisture environments. Cultivar blending had little effect on forage production and quality, indicating that it could be used without the fear of sacrificing forage production or quality, but the best blend proportion was affected by the environment, indicating the choice of blends should be tailored to their growing areas.

Acknowledgement

This research was done collaboratively with Dr. Ken Vogel, USDA-ARS grass breeder, whose crew did the forage harvesting and quality assessment.

Editor's Note: Baenziger is Eugene W. Price Distinguished Professor. Lekgari is a former graduate student on the Small Grains Project; he is currently a Ph.D. student working with Dr. Ismail Dweikat.

CGS Associates

Larkin Powell will be a Fulbright Scholar at Polytechnic of Namibia in Windhoek, Namibia during 2009. He will teach courses in natural resource management and ecology, and will conduct a study of private landowners to determine how they make decisions regarding grassland and game management.

Are the Sandhills Fragile? (continued from page 1)

force controlling species composition. We were wrong. Precipitation accounted for only 9% of the variation. The level of grazing had the greatest influence, accounting for 51% of the variation.

By 1929, little bluestem was becoming weaker in several plots and hairy grama was increasing – the result of heavy grazing. In 1931, hairy grama was decreasing in dominance and many weeds including sixweeks fescue and povertygrass were increasing. Little bluestem had been reduced in many plots and eliminated from some by severe grazing. However, the USFS achieved its initial goal to reduce standing vegetation and shift the dominant plant community so the area would serve as a firebreak.

The overall quality of the grassland was deteriorating because of grazing, reflected by decreasing frequencies of the perennial grasses. By 1938, little bluestem had greatly decreased and was gone from many plots. Hairy grama was also greatly reduced, but remained a dominant component of the plant community. Sixweeks fescue and other weedy species occupied many of the open spaces, but the frequency of the native perennial prairie sandreed increased in many plots. Not all species responded the same. Switchgrass and woolly plantain increased, whereas leadplant, western ragweed, and wild rose remained relatively stable through the drought.

In his assessment of the plant community in 1948, H.E. Schwan of the USFS said that little bluestem was the main component of the plant community, followed by hairy grama. The response of individual species varied in 1948, but sand bluestem, prairie sandreed, switchgrass, western ragweed, cudweed sagewort, lead plant, and wild rose all returned to at least their pre-drought frequencies.

Data collected from 1979 to the present reveal that not all species returned to their pre-drought levels. Indiangrass, New Jersey tea, and western sandcherry were greatly reduced by the severe disturbance of the 1930s and never returned to pre-drought levels – indicating a permanent change in the vegetation. Kentucky bluegrass and needleandthread were not recorded during the period of 1926 to 1948 but now occur at significant levels, reflecting a USFS decision to graze moderately June through October. Introduced species are more prevalent today than before 1979.

Even with the differences in how individual species responded, the influence of grazing exceeds that of precipitation when long-term vegetation dynamics are considered. Several decades of moderate grazing allowed a little bluestem-dominated community to return and persist.

Simulation models based on precipitation levels of the mid 1930s predicted that decades of prolonged drought in the Sandhills would most likely decrease above-ground primary production, but this decrease would not be severe enough to cause widespread dune movement. Potentially, a severe drought lasting several decades, coupled with heavy grazing, could create a situation in which above-ground and below-ground primary production were reduced to the point that allows the dunes to move. Today, this condition is less likely to occur because improved management and conservation-minded land practices have improved the resilience of the Sandhills to resist severe disturbance.

In this study, several fluctuations in annual precipitation occurred without a shift in dominant species. This indicates that precipitation alone is not a strong environmental factor with lasting negative effects on the plant community. Although some species decreased in frequency as precipitation decreased, no consistent vegetation trends emerged – indicating the plant community was not negatively influenced by reduced precipitation at the level experienced in the 1930s.

Under extreme environmental conditions, any grassland could be susceptible to community changes, but from our findings, it's likely that the Sandhills are no more susceptible to plant community changes than are other temperate grasslands.

Editor's Note: Stubbendieck is professor of grassland ecology and Tunnell is a former senior research associate.

Progress Being Made in Implementing the Nebraska Natural Legacy Plan

Initial efforts to implement the Natural Legacy Plan have focused on nine Biologically Unique Landscapes (BULs) that currently have "Flagship Initiatives" underway (see map). Flagship Initiatives are coordinated efforts that include conservation actions on private and public lands, education and outreach, and monitoring and research. Coordinating biologists have been hired to oversee these initiatives in the Flagship BULs. Funding for these initiatives has come from major grants from the Nebraska Environmental Trust and the US Fish and Wildlife Service's Landowner Incentive Program and State Wildlife Grants program. Additional funding has come from NRCS's Farm Bill conservation programs, Nebraska's Wildlife Conservation Fund, and USFWS Endangered Species Fund.

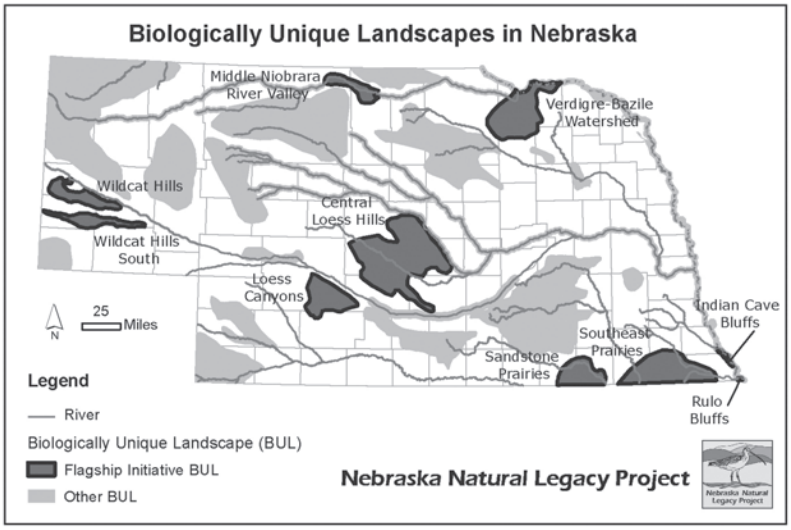
Much of the initial effort in these Flagship BULs has been working with private landowners to implement voluntary conservation measures. Financial incentives and technical assistance are provided to landowners to assist in applying land management practices that benefit our flora and fauna. The bulk of the work to date has focused on improving native prairie habitat by conducting tree clearing, using prescribed fire, and implementing prescribed grazing. These practices not only improve habitat for native prairie species, they also typically improve livestock grazing. Projects conducted so far and planned for 2008 will benefit tens of thousands of acres of prairie in the Flagship BULs.

Projects are also underway to implement the Legacy Plan on conservation lands – those lands owned by state and federal agencies and non-profit conservation organizations. Projects have included implementing land management practices on Game and

Parks Commission, The Nature Conservancy, the Audubon Society, and Platte River Basin Environments lands.

The success of these Flagship Initiatives depends upon the cooperation of a number of conservation partners and private landowners, as well as the public in general. One of the first actions of the coordinating biologists is to conduct outreach activities including holding public meetings, putting on landowner workshops, and engaging the conservation agencies and organizations that are active in their BUL. Efforts are also made to set up a local steering committee to help oversee implementation of the plan. The coordinating biologists soon learn why their job has the title it does; effective conservation initiatives involve a variety of partners and require a great deal of coordination.

A number of inventory projects have been carried out in the Flagship BULs to identify new populations of at-risk species and high-quality examples of natural communities. The results of these surveys will help identify areas of high conservation values within the BULs. A major research project is being planned for BULs in the tallgrass region that would evaluate the benefits of a patch burn/grazing management system. A team is also working on developing an overall plan for monitoring the success of the Legacy Plan.



If you would like more information about the Nebraska Natural Legacy Plan and its implementation, visit the Legacy website at www.OutdoorNebraska.com/wildlife/programs/legacy or contact Mark Humpert, Wildlife Diversity Program Manager, 402-471-5328.

Editor's Note: Excerpted from "Something Wild," the 2008 Nebraska Game and Parks Commission Annual Report of the Wildlife Conservation Fund.

August 1 is Pre-registration Deadline for Nebraska Grazing Conference

While walk-in registrations are accepted, you'll want to take advantage of the pre-registration price for the 2008 Nebraska Grazing Conference at the Kearney Holiday Inn on August 12 and 13. The conference program is listed below.

The two-day pre-registration fee of $75 (made out to 2008 Nebraska Grazing Conference) is due to the Center for Grassland Studies by August 1. One-day registrations are also available. New this year – **registration fee will be waived for students who will be in high school next year** and who pre-register by August 1, compliments of the UNL College of Agricultural Sciences and Natural Resources. Reduced registration fees apply for other full-time students. Late fees apply to all registrations postmarked after August 1 and to walk-ins.

Participants of any of the previous Nebraska Grazing Conferences as well as all Nebraska extension educators should have received a brochure in the mail in June. Information and the registration form are also on the CGS Web site (www.grassland.unl.edu). The Center for Grassland Studies is one of the underwriting sponsors and provides overall coordination of this conference, which draws close to 250 people annually.

Tuesday, August 12

9:00 Registration (browse exhibit area, refreshments available)

10:00 Welcome, Roger Chesley, Callaway

10:10 Opening remarks to the Nebraska grazing community, Tom Hansen, rancher and state senator, North Platte

10:30 Marketing grass-fed beef: supply and demand, methods, tactics, and pitfalls, Allen Williams, Tallgrass Beef Co., LLC, Sedan, KS

12:00 Lunch

12:45 There ought to be a place! Chuck Schroeder, National Cowboy & Western Heritage Museum, Oklahoma City, OK

1:30 Legumes in grass pastures, Bruce Anderson, University of Nebraska–Lincoln (UNL), Lincoln

2:15 Modifying animal behavior, Ray Bannister, Wibaux, MT

3:00 Break (browse exhibit area, refreshments available)

3:30 Concurrent sessions:
Grazing basics: Terry Gompert, UNL, Center; Bob Scriven, grazing consultant, Kearney
Grazing and wildlife: Mel Nenneman, Valentine and Ronnie Sanchez, Kearney, U.S. Fish and Wildlife Service; Larkin Powell, UNL, Lincoln

5:00 Adjourn (browse exhibit area, cash bar)

6:00 Banquet

7:00 Bullpen sessions: Allen Williams (beef marketing); Ray Bannister (animal behavior); panel – Walter Schacht, UNL, Lincoln; Jon Albro, Ridley Block Operations, Bayard; Steve Chick, Nebraska NRCS, Lincoln; Dave Hamilton, Thedford (grazing-related career opportunities)

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Achieving Sustainable Mixed Agricultural Landscapes in Grassland Environments
Oklahoma City, OK

Farming with Grass:
Achieving Sustainable Mixed Agricultural Landscapes in Grasslands Environments

The Soil and Water Conservation Society (SWCS) will convene a conference to address the factors driving change in mixed agricultural systems. Specific objectives include:

- Engage participants across diverse disciplines and institutions in identifying research, technology, and policy needs to maintain competitive and environmentally sound agricultural systems under dynamic natural, social, economic, and policy drivers.
- Provide professional development and networking opportunities
- Identify key knowledge gaps and technology limitations that impede the ability of individuals and communities to evaluate options to meet multiple objectives
- Identify policy alternatives to promote sustainable agricultural systems

The Call for Papers closes on February 6th. Complete information at www.swcs.org/fwg

Program/Agenda

The three-day conference will consist of invited keynote speakers, submitted posters, and facilitated roundtable discussions organized around the following topic areas:

1. **Status and trends** in types of agricultural systems, inputs, productivity, profitability, environmental indicators, and rural demographics and economics. Lead speaker: John Ikerd, Professor Emeritus of Agricultural Economics, University of Missouri
2. **Environmental, social, and economic benefits** of mixed grassland landscapes to include farm level, rural community, and broad social perspectives. Lead speakers: Deborah E. Popper, Associate Professor of Geography, College of Staten Island, City University of New York and Frank J. Popper, Professor, Planning and Public Policy Program, Bloustein School of Planning and Public Policy, Rutgers University
3. **Factors driving change** in grassland environments (e.g., resource availability, demographics, social dynamics, economics, climate change, farm, environmental and energy policy, and local zoning/farmland preservation) Lead speaker: Vivien Gore Allen, Thornton Distinguished Chair, Department of Plant & Soil Science, Texas Tech University
4. **Assessment tools** for monitoring and predicting changes and to support scenario analyses of alternatives and tradeoffs. Lead speaker: Dennis Ojima, Senior Scholar, The H John Heinz III Center for Science, Economics, and the Environment
5. **Science and policy** needed to sustain agriculture in mixed grassland environments, including role of market-based tools, state and local water laws and policies, and environmental trades (e.g. greenhouse gas emissions, water allocation, effluent releases). Lead speaker: George Boody, Executive Director, Land Stewardship Project

Conference Schedule

October 20, 2008

2:00 PM	Opening Session Dr. Frederick L. Kirschenmann Leopold Center for Sustainable Agriculture
4:00 PM	ARS Grazinglands Research Laboratory, El Reno, OK

October 21, 2008

8:00 AM	Topic 1 Keynote; Response One/Two
9:30 AM	Break for viewing and discussion of posters on Topics 1 and 2
10:00 AM	Topic 2 Keynote; Response One/Two
11:30 AM	Lunch & Moderated Roundtable Discussion of Topics 1 and 2
1:30 PM	Topic 3 Keynote; Response One/Two
3:00 PM	Break for viewing and discussion of posters on Topic 3
3:30 PM	Moderated Roundtable Discussion of Topic 3
5:00 PM	Reception for discussion of posters
Evening	No scheduled activities Bricktown shuttle available

October 22, 2008

8:00 AM	Topic 4 Keynote; Response One/Two
9:30 AM	Break for viewing and discussion of posters on Topic 4 and 5
10:00 AM	Topic 5 Keynote; Response One/Two
11:30 AM	Lunch & Moderated Roundtable Discussion of Topics 4 and 5
1:30 PM	Closing Plenary Jean Steiner, USDA-ARS Craig Cox, SWCS Executive Director

SWCS will develop the conference proceedings and will disseminate the findings and recommendations to key scientific, policy maker, and agricultural audiences.

August 1 is Pre-registration Deadline for Nebraska Grazing Conference

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Wednesday, August 13

7:30 Refreshments available in exhibit area

8:30 Land monitoring for management decisions, Charley Orchard, Land EKG, Inc., Bozeman, MT

10:00 Utilizing co-products in a beef livestock operation, Rick Rasby, UNL, Lincoln

10:30 Break (browse exhibit area, refreshments available)

11:00 Concurrent sessions:
Co-products: Loren Berger, Stapleton; Bob Price, Burwell
Grassland monitoring: Bethany Johnston, UNL, Thedford; Cindy Tusler, UNL, Rushville; Don Reeves, Central City

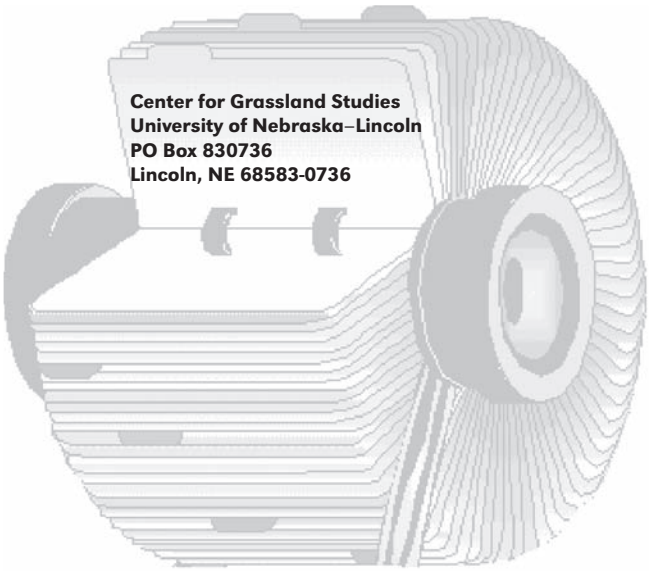
12:00 Lunch

12:45 Our operation and transitioning to organic production, John Ravenscroft, Three Bar Cattle Company, Cherry County

1:15 Winter grazing strategies, Jerry Volesky, UNL, North Platte

1:45 Grazing managers adapting to high feed and fuel costs, Homer Buell, Bassett; Alan Janzen, Henderson; Jay Wolf, Albion

2:45 Wrap-up, evaluations and adjourn



We've Moved!

The CGS offices have moved temporarily while Keim Hall is being renovated. For approximately two years we will reside in 306 Biochemistry Hall, which is conveniently just across the street from Keim Hall. Our new mailing address is: Center for Grassland Studies, University of Nebraska–Lincoln, PO Box 830736, Lincoln, NE 68583-0736. All phone numbers remain unchanged.

Address Service Requested

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