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Center for Grassland Studies

Winter 1997 Newsletter

Volume 3, No. 1
Winter 1997

From the Director

As we begin a new year, it is appropriate to review certain significant activities of the past and look ahead to the future.

The Center for Grassland Studies, with support of the IANR Administration, initiated and continued discussions on an integrated beef production systems project. Dr. John Ward reviewed and summarized work that had been done mostly in Nebraska, and identified where some of the voids remain relative to the efficient utilization of forages in the beef cattle production system. Concept papers were prepared on this topic as well as on Grassland Ecosystem Health and Sustainable Landscapes by numerous Associates of the Center.

Follow-up sessions on these concept papers were held in Lincoln on January 8 to explore opportunities for projects in these areas. An excellent mix of Associates led to interesting project ideas that we hope will result in strong proposals going forth in the future. Thanks to Ken Vogel, Ron Case, Terry Klopfenstein, Lowell Moser, and Terry Riordan for leading their respective discussions.

The Center hosted a meeting on Grassland Ecosystem Health with representatives of Langston University, the Natural Resources Conservation Service, the Agricultural Research Service, and the Forest Service from the U.S. Department of Agriculture. There will be a follow-up meeting in late winter to pursue potential activities on this subject.

Several of our Associates have been working on improving turfgrasses and landscape plants and associated management practices for use in developing and maintaining more environmentally friendly areas. One such project involves the National Arbor Day Foundation, various turfgrass and golf entities, and individuals who are interested in developing an environmentally friendly golf course and natural area near Nebraska City, Nebraska. Our Citizens Advisory Council member, Bill Kubly, and his company, Landscapes Unlimited, Inc., have been the leader in this significant effort.

In December, I participated in the Grazing Lands Forum held in Washington, D.C. This Forum is hosted each year by the National Capitol Section of the Society for Range Management. The program was entitled, "Sustaining the Landscape—Sustaining the Lifestyle." This Forum was highly interesting and productive, with groups reporting on successful community based projects. It is heartening to see representatives of several agencies come together to address their local problems.

The Center sponsored another successful seminar series during the fall semester of 1996. Seminar speakers included University faculty, visiting scientists, and graduate students from various departments. Our largest session drew 72 people.

As the new year continues, we look forward to working with the Center's Associates, Advisory Council members, supporters and friends on behalf of our many grasslands.

Pasture Songbirds

by *Laura Paine and Dan Undersander*

Department of Agronomy, University of Wisconsin

In a 1994-95 study, we looked at pasture habitats for grassland songbirds. Grassland birds nest on or near the ground. They are an integral component of the grassland ecosystem that once existed across the midwestern and plains regions of the U.S. and Canada. As a group, they have suffered some of the most severe population declines among songbird species. Our ability to provide safe, suitable habitat for them in the agricultural landscape is a measure of the sustainability of our farming systems.

The movement toward management intensive grazing among livestock farmers could help reverse these population declines by providing many more acres of suitable habitat for grassland wildlife. Our goals have been to learn what kind of habitat rotational pastures provide for grassland birds, how successful they are nesting there, and whether there are changes that we can make to improve nesting success without interfering with the farm operation. Because of this last goal, we collected a lot of forage production and quality data as we implemented these modifications. We are summarizing the forage data from three grazing seasons.

Our first goal was to determine which bird species are actually nesting in pastures and which are “just passing through.” Those first birds that we hear singing in the spring are mostly males, and it is the male’s job to locate and claim a suitable territory. Once he has claimed a territory, he is unlikely to leave it. We can use this behavior to study nesting with a technique called territory mapping. We locate a singing male and walk toward him. He will eventually fly, but only to another perch within his territory. If you continue following him, he will outline his territory for you. If he flies away, he is probably just passing through. Using this method, we have found that some species like savannah sparrows, have relatively small territories — a five-acre paddock can provide a home for three or four pairs. Meadowlarks on the other hand, may stake out 10 acres or more for their territory, and other species require even more space. At the other end of the continuum are species like the red-winged blackbird which often nest close together, several females with each male.

Our research shows that many more birds and more different species are attracted to grass-based farms than are found on conventional livestock or grain farms, and we start to see some of the more rare species like upland sandpipers and northern harriers (marsh hawks) on the larger rotational farms. We recorded more than twice as many nesting pairs of grassland songbirds in rotational pasture as we found in the same acreage of continuously-grazed pastures. The primary reason for this is that many continuous pastures are very small, often overgrazed and usually near buildings, crop fields, or trees and isolated from other grassy cover.

Another question we wanted to answer is whether the grazing and grass growth cycles of a rotational system mesh with the breeding cycles of the nesting birds. It takes between 28 and 35 days to complete a nesting cycle. Nesting begins for some species as early as April and most nesting has ended by mid-July. The peak of the nesting season in May and June coincides with the spring flush of grass growth when the cattle are being moved rapidly through the paddocks. The effect of cattle disturbance becomes a critical factor in the survival of nests because the cattle are likely to be returned to a paddock before a nesting cycle can be completed.

We therefore looked at a grazing system which employs some “bird-friendly” modifications. The centerpiece of the bird-friendly system is the concept of a refuge — an area in which grazing is deferred during the nesting season. We worked with four graziers in southwestern Wisconsin who set aside refuge areas ranging from 10 to 40 acres. Grazing was deferred in these areas for four to seven weeks during the 1994 and 1995 nesting seasons. After the refuge period, most of these areas were cut for hay. We monitored

bird activity as well as forage yield and quality both in the refuges and in adjacent rotationally grazed paddocks. In addition, we continued to monitor grassland bird populations in continuously grazed pastures on nearby farms.

To get a sense of how successful the birds are at nesting in the pastures and refuges, we found and observed over 230 nests of red-winged blackbirds, savannah sparrows, meadowlarks, bobolinks, killdeer, vesper sparrows, brown thrashers, grasshopper sparrows, and upland sandpipers during the two years of the study. Of the nests that we found, fewer than 20% were found in continuously grazed pastures; the majority were located in rotational paddocks or refuges.

Under ideal conditions, in undisturbed prairie sites, only about 60% of nests built will be successful. Predation, bad weather, and many other factors conspire to cause nest failure. In a pasture situation, disturbance by cattle is an added risk. In our study, nest survival varied from a low of 5% in some intensively grazed rotational paddocks to a high of 40% in some of the refuge areas. Causes of nest failure in rotational paddocks varied, with natural causes (predation and abandonment), cattle trampling, and mowing accounting for roughly equivalent percentages in the rotational pastures. In refuges, the primary causes of nest failure were mowing and predation. Nests in continuous pastures had a survival rate of about 25% in both years.

These figures seem quite low, but they're not so bad if you compare them to the alternative. A typical confinement dairy farm in Wisconsin is likely to consist of similar acreages of alfalfa and corn, with little or no pasture. A pasture-based farm provides many more acres of appropriate habitat and even with low survival rates, has the potential to produce many more successful nests. And deferring grazing in some paddocks during the nesting season can nearly double the number of successful nests produced on grass farms.

How can one afford to set aside areas for four to six weeks at the height of the growing season? The graziers in our study cut and baled the forage from these areas for dry cow hay. To our surprise, the forage quality in these six-week-old pastures was only slightly lower than that of the rotational paddocks we sampled during that period, with crude protein levels in the mid-teens and relative feed values at around 100. We found that pastures with a high legume content maintained their quality better than more grassy pastures, and that some grasses, such as orchardgrass, tend to head out more quickly than others and are thus more difficult to manage in deferred paddocks.

One intriguing approach to providing nesting cover would be to plant some acres to warm-season grasses like switchgrass and big bluestem. They make their greatest growth during the heat of summer and can provide fresh, high-quality forage during July and August when cool-season grasses tend to go dormant. The side benefit for nesting grassland birds is that while we're grazing cool-season paddocks in the spring and early summer, the warm-season paddocks are left undisturbed.

In a new study started in 1996 we are exploring ways of incorporating warm-season grasses into pasture systems. We've also started another study that looks at grazing and riparian areas, which has a fisheries component in addition to wildlife and forages.

Editor's Note: For more information, contact Laura Paine, 608-262-6203, lkpaine@facstaff.wisc.edu.

New Nutritional Information For Beef Producers in 1997 Nebraska Beef Report

by Dennis Brink, Department of Animal Science, UNL

Protein and mineral nutrition of the beef cow is a key component of forage based beef production systems. The *Nebraska Beef Report* is an annual report published by the UNL Animal Science Department.

The 1997 report contains several excellent articles with new information regarding the nutrition of the beef cow. Below are highlights of several key research articles.

* * *

Seasonal Changes in Protein Degradabilities of Sandhills Native Range and Subirrigated Meadow Diets and Application of a Metabolizable Protein System

Greg Lardy, Don Adams, Terry Klopfenstein, Dick Clark, and Jim Lamb

Familiarity with the nutritional composition of cattle diets from upland range and subirrigated meadow can be a valuable tool for beef producers. The 1996 National Research Council Beef Cattle Requirements use a metabolizable protein system. For this system to be most effective, precise values for protein degradability of feedstuffs are necessary. The objectives of this research were to characterize the seasonal changes in forage quality and protein degradability of upland range and subirrigated meadow diets and compare them to beef requirements of spring calving cows. The results of the study indicated meadow and range diets increased in digestibility, crude protein and escape protein during periods of active growth. For spring calving cows, the metabolizable protein system, in general, predicted that degradable protein was more deficient than metabolizable protein during gestation. However, during lactation, metabolizable and degradable protein were deficient when cows were fed meadow hay or grazed dormant forage. The authors concluded from their study that the use of the metabolizable protein system in the 1996 National Research Council publication should allow beef producers to more accurately predict the type and amount of supplements necessary to maintain the cow herd during different times of the year.

First Limiting Nutrient of Native Range for Summer Calving Cows During the Breeding Season and Late Lactation

Greg Lardy, Terry Klopfenstein, Don Adams, Jim Lamb, and Dick Clark

Limited information is available regarding the supplementation needs for summer calving cows during the breeding season and late lactation. The objectives of this study were to determine the limiting nutrient for summer calving cows grazing native range during September and October (breeding season) and during November and December (late gestation). This work indicates, especially during the breeding season, a small amount of a strategic input can help cows maintain body weight and condition while still producing adequate milk for acceptable calf gains. The supplemental needs of the summer calving cow at this time would best be met by using a source of protein that contained both rumen degradable and escape protein in equal proportions.

Rumen Degradable Protein Requirement of Gestating Summer Calving Beef Cows Grazing Dormant Native Sandhills Range

Greg Lardy, Terry Klopfenstein, Don Adams, Jim Lamb, and Dick Clark

No research data are available regarding the requirement for supplemental rumen degradable protein in the summer calving cow grazing dormant native Sandhills range; therefore the objectives of this study were to determine the supplemental rumen degradable protein requirement for gestating summer calving cows grazing during late winter. This trial indicates the summer calving cows require small amounts of rumen degradable protein to maintain weight in late winter while grazing dormant Sandhills range.

Supplemental Protein on Performance of Lactating Beef Heifers

Gene Deutscher, Don Adams, Duane Farthing, Jim Lamb, Dave Colburn, and Merlyn Nielsen

A major challenge for beef producers is to obtain high rebreeding performance for two-old heifers after calving. Heifers are often calved in late February or early March and fed subirrigated meadow hay until native range can be grazed in mid-May. This study was conducted to determine the effects of feeding a supplement containing 35 to 40% crude protein with meadow hay. In the study supplemental protein did not affect intake and digestibility of subirrigated meadow hay in lactating two-year-old cows. However,

supplementation did increase heifer and calf weights before the breeding season. Furthermore, the supplemented heifers conceived and calved earlier for the second calf than the non-supplemented heifers.

Effects of Supplementing High Levels of Cu, Co, Mn, and Zn after Calving on Productivity of Two-Year-Old Cows

Pete Olson, Dennis Brink, Gene Deutscher, Mike Carlson, Dave Hickok, Norm Schneider, and Dave Colburn

The ability of forages to provide the required amounts of trace elements has been questioned for many years. In addition, recent research with feedlot cattle has indicated beneficial effects of high levels of certain trace elements during periods of stress. The two-year-old beef cow, with her nutritional stresses from calving to breeding, may respond to dietary additions of trace elements. The objective of this study was to evaluate supplementation of copper, zinc, cobalt, and manganese from calving to breeding of two-year-old cows. The results of the study indicate when cow management, health and nutrition are adequate, supplementation of trace elements at high levels from breeding to calving is not beneficial and may in fact be detrimental to reproductive performance.

Effects of Copper and Selenium Injections on Cow Productivity and Concentration of Copper in Liver Biopsy Samples

Jerre Johnson, David Hickok, Dennis Brink, and Pete Olson

Copper and selenium are important in several aspects of normal body function. The grazed and harvested forage on a ranch may vary in the copper and selenium content with years. The objectives of this study were to evaluate for three years the value of copper and selenium injections in the cow herd. In the study analysis of hay samples indicated the forages consumed by the cows contained 5.9 to 6.6 ppm copper and 5.4 to 6.0 ppm molybdenum. In the conditions of the study when additional copper and selenium were provided by injections, cow reproduction and calf performance were not improved.

* * *

The *1997 Nebraska Beef Report* contains over 25 additional research articles on a variety of topics related to beef production. Summaries of all the reports may be obtained from extension educators or on the World Wide Web at: <http://www.ianr.unl.edu/ianr/anisci/beef/br97/index.htm> For a copy of the entire report contact the Center for Grasslands Studies.

U.S. Forest Service Revising Grassland Management Plans

by Tom Domek, Nebraska National Forest

The U.S. Forest Service is revising land and resource plans that will affect the management of national grasslands on the northern Great Plains for the next 10 to 15 years.

Three national forests that administer the grasslands are undertaking the effort: Custer, Nebraska and Medicine Bow/Routt National Forests. This combined planning task is called the "Northern Great Plains Plans Revision."

Roughly 3.1 million acres encompass the plan revision area: Little Missouri, Sheyenne, Cedar River, Grand River, Oglala, Buffalo Gap, and Ft. Pierre National Grasslands in the Dakotas, Thunder Basin National Grassland in Wyoming, and units of the Nebraska National Forest in Nebraska, including the Pine Ridge District, Samuel R. McKelvie National Forest, and Bessey District.

Land and resource management plans, commonly called forest plans, are designed to provide a systematic interdisciplinary approach to determine management strategies on public lands. This approach attempts to balance the use and sustainability of natural resources. Existing management plans for the

grasslands are in need of change, in light of technological and scientific advances, and ever-changing ecological and social matrices.

Three separate forest plans will be developed, which will be accompanied by one environmental impact statement. Although these units are often separated by long distances and state boundaries, they share many physical, biological and social elements. As such, national forest and grassland cadre will look beyond their own administrative boundaries for a “big picture” sense of the environment. This more “boundaryless” approach will enable the involved scientists and specialists to develop and share ecological assessments, plan-related analyses and resource expertise.

Not only will the combined revision effort save taxpayers money, it will also provide opportunities to analyze the Great Plains environment far beyond the boundaries of distinct public grassland units to include public grasslands in four states: the Dakotas, Wyoming, and Nebraska.

This revision process will involve interested parties from tribal and governmental agencies at the local, county, state and federal levels, interest groups such as livestock associations and environmental groups, and concerned citizens. In fact, anyone can participate. (See address at the end of this article.) The public will be given many opportunities to provide input and learn more about management of units on the northern Great Plains.

Currently, the revision team is drafting an *Analysis of the Management Situation* document, which describes the existing conditions found on the affected revision units. That document will include “revision topics.” Revision topics help forest and grassland managers categorize issues and topics of primary concern. The revision topics identified for this revision effort include: 1) Rangeland and Forest Health, 2) Community and Lifestyle Relationships, 3) Livestock Grazing, 4) Oil and Gas Leasing, 5) Plant and Animal Control, 6) Recreation and Travel Management, and 7) Special Area Designations.

Please stay tuned. Many important management decisions will result from the “Northern Great Plains Revision,” and we hope to get as much input as possible. For more information, contact: Northern Great Plains Management Plans Revision Team, 125 North Main Street, Chadron, NE 69337, 308-432-0300, fax: 308-432-0309.

IANR Employees Recognized at Nebraska Turfgrass Conference

Three Institute of Agriculture and Natural Resources staff were recognized at the 1997 Nebraska Turfgrass Conference which drew over 800 people to Omaha January 13-15. The Nebraska Turfgrass Foundation gave editor Lisa Jasa the “Extra Mile Award” for her work on *Integrated Turfgrass Management for the Northern Great Plains*. Release of this publication was one of the highlights of the conference. It features 236 pages of turfgrass management advice, including diagnostic flow charts, full color photographs of disease and insect pests and abiotic turf problems.

John Fech, Extension Educator, received a “Certificate of Achievement” from the Nebraska Professional Lawn Care Association (NPLCA) for his promotion of sustainable landscape management on television and radio. Roch Gaussoin, Extension Turfgrass Specialist, was also recognized by the NPLCA as “1996 Educator of the Year” for his program efforts directed at homeowners and lawn care professionals.

Martin Massengale, CGS Director, was awarded the 1997 Distinguished Service Award by the Nebraska Crop Improvement Association.

New CAST report: *Grazing on Public Lands* (Interpretive Summary)

This CAST report discusses and provides scientific information concerning livestock grazing on public lands in the western United States. Concerns have been expressed that livestock grazing has caused diminished biodiversity, poor range condition, soil erosion, depleted riparian areas, reduced wildlife and wildlife habitat, and decreased recreational opportunities. Another perception is that grazing fees paid to the government to graze livestock on public land are too low.

Approximately 262 million acres of public land in the West are grazed by domestic livestock. The common intermingled public- and private-land ownership patterns resulting from railroad land grants, homesteading, and other programs cause management problems for both federal and private land owners and managers.

Sustainability of Grazed Ecosystems

Proper grazing of rangelands is sustainable. For several decades following settlement, however, western public rangelands were not managed and most were overgrazed. Livestock grazing was regulated first in 1897 on the Forest Reserves and then in 1934 on the rest of the public rangelands. After management began, deteriorated range conditions began to improve. United States rangelands, with some exceptions, are now in their best condition this century.

Range Condition

The range condition concept used in the United States predicts that, in areas where species composition has changed due to grazing, cessation of grazing will result in return to the former “natural,” or “climax,” state. Newer ecological information indicates that this may not occur in a time frame meaningful to management, i.e., years to decades, especially in ecosystems dominated by shrubs. Restoration of areas to their “presettlement” state may be impossible or require greater manipulation than a mere decrease of grazing. Newer range-condition models better explain the dynamics of rangelands but have not been adopted.

Effects of Grazing on Other Rangeland Uses and Values

Biological Diversity: Livestock grazing can either increase or decrease diversity. Both ungrazed and heavily grazed areas often will be less diverse than moderately grazed areas.

Riparian Areas: Stream corridors in the West have been altered by road building, mining, timber harvesting, recreation, diverting water, and irrigating as well as by grazing. Improper livestock grazing can damage riparian areas. Most riparian areas, however, can be grazed safely if stocking rate, season, and length of grazing period are proper.

Wildlife Habitat: Well-managed livestock grazing generally is compatible with habitat needs for many game and nongame wildlife species.

Timber Production: Many western mature forest types have minimal or temporary forage values. Managed grazing, especially by sheep or goats, can stimulate growth of young trees by removing competing plants.

Recreation: The impacts of livestock grazing on outdoor recreation and aesthetics vary. Conflicts occur, but well planned livestock grazing and recreation can peacefully coexist for mutual benefit.

Tools for Management of Rangelands

Grazing systems rotate use among pastures and control time of grazing, stocking rate, and utilization

levels.

Fire was a natural part of most rangelands. Fire-return intervals lengthened because early heavy grazing and deliberate fire control depleted fine fuels. Without fire, sagebrush and juniper trees invaded areas. Fire now is being returned to many ecosystems.

Other range improvements such as herbicides, mechanical methods, and biological controls (including grazing) can be used to manage unwanted shrubs and weeds.

Seeding can increase forage production or ground cover for erosion control, but costs are high. Most seeding is done on drastically disturbed sites.

Socioeconomic Implications of Public-Land Grazing Future of Public-Land Grazing

In 1992, a 48% increase in demand for grazed forage was predicted to be met, mainly from private rangelands by 2030. The structure of the western ranching industry and the low productivity of western rangelands make it unlikely that this projected increased forage demand can be met exclusively from private rangelands. A decline in public-land grazing also was predicted.

About 20% (6 million) of beef cattle in the United States are in the 11 western states. More than half of these animals graze on the 262 million acres of Bureau of Land Management or U.S. Forest Service lands. Federal grazing permits complement the common cow-calf and cow-calf-yearling operations and help stabilize the western livestock industry. In most western states, beef cattle are the highest or the second highest income producer in agriculture.

When grazing on public lands was initially regulated by the federal government, permits to graze allotments were awarded to local ranchers who owned private land and/or water rights and historically had used these rangelands. In western states in which a large percentage of land is federally owned, there is insufficient private land to substitute for public land, should grazing be prohibited on it.

The Grazing Fee Issue

Private grazing rental rates are higher than the federal grazing fee but the two types of leases are not analogous. Most federal land is extensive, steep, and difficult to manage; homesteaders settled on more productive lands. Also, private leases generally include all improvements and may include management and exclusive use of the land. Federal grazers must share the land with other users; and management agencies restrict the time and pattern of livestock grazing, require construction and/or maintenance of improvements, and impose ever-increasing overhead (nonfee) costs.

If federal grazing fees were increased to the level of private lease rates, grazing on public lands would not be economically feasible for many public-land-dependent livestock ranchers and would contribute to the decline of western rural communities. Some ranchers priced off of public lands would have to sell their livestock and subdivide or sell their private-land holdings to developers. Others would greatly intensify their livestock operations on private land. Either action can have serious ecological consequences and affect valuable winter wildlife habitat for big game herds.

Info Tufts

The 1992 National Resources Inventory of private rangeland showed the following conditions for Nebraska: 20% excellent, 47% good, 28% fair, and 5% poor; the numbers for the Northern Plains Region are 11%, 45%, 35%, and 9%, respectively. The NRI will survey again this year.

In 1992 NRCS had 251 grazing lands specialists; according to Dennis Thompson, NRCS grazing lands leader, as of Fall 1996 that number was 331.

The Oglala National Grassland in northwestern Nebraska is one of 20 national grasslands in the U.S. To learn about the social engineering responsible for its creation, contact the CGS for a copy of a 1994 paper by UNL Ph.D. candidate Francis Moul.

Harold Andersen, former publisher and chairman of the Omaha World Herald, and his wife, Marian, recently donated \$1.15 million to the University of Nebraska; an endowment of \$150,000 will be used to publicize and encourage soil and water conservation. Several years ago when he was executive editor of the Omaha World Herald, Harold was instrumental in initiating the Master Conservationist Awards, eight of which will be given this year.

Sandhills Partnership Receives Grant for Fen Restoration

In October, 1996 the Nebraska Environmental Trust awarded \$385,000 to The Nature Conservancy and the Sandhills Task Force to help acquire 2,700 acres on which reside two Sandhills wetlands known as the Jumbo Valley and Pullman Valley fens. The fens, which total 700 acres, will be restored; the other 2,000 acres are being leased for grazing.

The award brings together an array of partners — including private landowners, biologists, hydrologists and federal and state resource managers — to find ways to sustain the unique biological, cultural and economic features of the Sandhills.

“The Sandhills Task Force and the Conservancy both believe conservation strategies have to fit realistically into local economies,” says Byron Eatinger, president of the Task Force and a rancher near Thedford. “We anticipate restoration of the fens will take about five years,” says Gene Mack, Sandhills coordinator for the U.S. Fish & Wildlife Service and a member of the Task Force.

Four other partners are providing resources and expertise: U.S. Fish & Wildlife Service, Nebraska Game & Parks Commission, Natural Resources Conservation Service, and Nebraska Cattlemen.

Sandhills fens are characterized by a high water table, peat soils and plants adapted to the wetland environment. They most often occur in the headwaters of streams or at the upper end of lakes and marshes. Fens are typically rich in plantlife. For example, a survey of fens in Cherry County found a total of 240 kinds of plants.

Aspirations go beyond revitalizing these fens. The Conservancy plans to develop conservation easements for the fens and resell them and the surrounding uplands, with the intention of getting the 2,700 acres back into the local economy. The net proceeds from the sale would be placed in the Sandhills Resource Conservation Fund, which would provide grants to landowners to do conservation projects that benefit both ranching and wildlife.

Source: *The Plains Messenger*, The Nature Conservancy's Nebraska Chapter Newsletter, Fall 1996.

Editor's Note: Eatinger is a member of the CGS Citizens Advisory Council, and Mack is a CGS Associate.

Resources

Grazing on Public Lands. \$20 + \$3 s&h. This 70-page report issued in December 1996 is well referenced and indexed. Council for Agricultural Science and Technology, 4420 West Lincoln Way, Ames, IA 50014, 1-800-375-CAST, cast@cast-science.org.

Integrated Turfgrass: Management for the Northern Great Plains. \$30 (payable to U. of Nebraska). Handbook written by the UNL Turfgrass Science Team for turfgrass professionals. Publications, University of Nebraska, PO Box 830918, Lincoln, NE 68583-0918, 402-472-9713. To learn more about the Turfgrass Science Team, see <http://hort.unl.edu/team.htm>

CRP Land Use Guide (EC 142). \$3 + \$1.50 s&h (free to UNL employees). According to agricultural economist Richard Clark, this publication (first mentioned in our Spring 1996 newsletter) is one of the best around for making decisions about land on which CRP contracts will expire. There is a good section titled "Consider economics of land use alternatives" that includes sample worksheets. Publications, University of Nebraska, PO Box 830918, Lincoln, NE 68583-0918, 402-472-9713.

Knee Deep in Grass. \$7 (\$7.35 in MN). Study of 29 grazing operations published by the Minnesota Institute for Sustainable Agriculture, item BU-6693-NR. Minnesota Extension Service Distribution Center, 1-800-876-8636, or 612-642-4900.

Calendar

[Contact CGS for more information on these upcoming events:](#)

March 10-12—Great Plains Symposium on Ogallala Aquifer: Managing for Drought and Climate Change, Lincoln, NE

March 12-14—Cover Crops, Soil Quality, and Ecosystems, Sacramento, CA

April 13-15—American Forage and Grassland Council Annual Meeting, Ft. Worth, TX

June 8-19—XVIII International Grassland Congress, Manitoba and Saskatchewan

June 13-26—Training Workshop on Sustainable Agroecosystems and Environmental Issues, West Texas A&M University

July 8-12—Private Grazing Lands in the 21st Century: Integrating Pastures, Environment, & People, Logan, UT

July 23-26—Soil and Water Conservation Society Annual Conference (focusing on ecosystem management within watersheds), Toronto, Ontario



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