Managed Grazing Education and Research in Wisconsin

A compilation of regional and statewide projects made possible by the Wisconsin Grazing Lands Conservation Initiative, 2002-2003

Edited by Jennifer Taylor,
UW-Madison Center for Integrated Agricultural Systems

June, 2007

This report and the projects summarized within it were funded by the Wisconsin Grazing Lands Conservation Initiative (GLCI) through the operations budget of the Wisconsin Natural Resources Conservation Service (NRCS).

The Wisconsin GLCI is a voluntary coalition of agriculture, conservation, and education groups. The Wisconsin GLCI Steering Committee includes the following organizations:

- Equity Livestock Cooperative
- Grass Works, Inc.
- Great Lakes Basin Grazing Network
- Soil & Water Conservation Society - Wisconsin Chapter
- The Nature Conservancy- Wisconsin Chapter
- Wisconsin Cattleman's Association
- Wisconsin Farm Bureau Federation
- Wisconsin Farmers Union
- Wisconsin Forage Council
- Wisconsin Land & Water Conservation Association
- Wisconsin Grazing Networks
- Wisconsin Sheep Breeders Cooperative
- Wisconsin Natural Resources Conservation Service
- University of Wisconsin Extension

For more information about the Wisconsin GLCI, please contact any of the above organizations, the State Grazing Lands Specialist, Brian Pillsbury, below, or the current chairman, Paul Onan, 9659 Grayson Road, Amherst Junction, WI 54407, 715-824-2527, ponan@wi-net.com

The Wisconsin NRCS state office is located at 8030 Excelsior Dr., Madison, WI 53717, 608-662-4422 and the website is: www.wi.nrcs.usda.gov. Regional offices are located around Wisconsin, including that of the State Grazing Lands Specialist, Brian Pillsbury, 505 Broadway, Rm 232, Baraboo, WI 53913, 608-355-4470, brian.pillsbury@wi.usda.gov

This report was authored and edited by the Center for Integrated Agricultural Systems (CIAS). CIAS is a research center for sustainable agriculture in the College of Agricultural and Life Sciences, University of Wisconsin-Madison. CIAS fosters multidisciplinary inquiry and supports a range of research, curriculum, and program development projects. It brings together university faculty, farmers, policy makers, and others to study relationships between farming practices, farm profitability, the environment and rural vitality. Go to www.cias.wisc.edu or call 608-262-5200 for more information.

Layout by Ruth McNair, CIAS.

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Introduction

The mission of the Wisconsin Grazing Lands Conservation Initiative (GLCI) is **"to expand the use of grazing-based livestock production systems that are profitable and foster environmental stewardship."** To carry out this mission, the Wisconsin GLCI provides grants for technical assistance, education, and research directly related to maintaining, improving and increasing acreage of private grazing lands in the state. Another goal is to increase landowner and public awareness about the importance of grazing lands as agronomic and natural resources.

The projects profiled in this report were funded by the Wisconsin GLCI in 2002 and 2003. Most of the education grants supported projects and organizations that have worked for several years to increase and improve managed grazing. Many of these activities were ongoing in 2007. They were carried out collaboratively with agencies such as UW-Extension, USDA Natural Resource Conservation Service (NRCS), Resource Conservation and Development (RC&D) Councils, Land Conservation Departments (LCD), the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), and the University of Wisconsin System.

One reason the GLCI grants program is effective is because of the diverse organizations and project leaders involved. Any farmer- or agency-led group having the interest, experience, and a sound proposal is eligible for GLCI support. Collaborating groups across the state participate in managed grazing education, research, and technical support projects that are designed with local expertise, enthusiasm, and needs in mind.

GLCI funding supports grassroots farmer networks, regional newsletters, workshops, educational programming, and outreach. The advancement and distribution of managed grazing information has succeeded because of the kinds of hands-on, farm-to-farm, and farmer-to-farmer learning experiences represented by the projects summarized here, coupled with the skillful coordination of project leaders and researchers. In addition, several projects have made managed grazing information, from pasture walk schedules to grazing research results, available online.

In these ways, the reach of GLCI-funded managed grazing projects has extended throughout Wisconsin, from areas with a decade-long history of managed grazing to regions where very little information or support was previously available. Every county in the state now has access to managed grazing information supported by these grants. Each region is included in or has access to grazing networks, which are a primary means for farmers to see and discuss managed grazing practices while learning from one another. While these grazing networks have successfully reached new farmers and provided support and information statewide, their feedback indicates that there is still a strong, growing need for managed grazing research and education.

Key findings

While each of the GLCI-funded education and research projects has taken its own approach to improving managed grazing in Wisconsin, there are enough similarities between many of them to consider their accomplishments and discoveries together. The **education** projects were mostly conducted from 2002-2004 and reported their activities in varying levels of detail. Some carried out specific, limited goals on a small budget, while others had comprehensive plans to build farmer participation and hire staff for individual assistance and grazing plan development. In a one-year period, as reported by the project leaders, more than:

Key findings

- An estimated 3,200 farmers were served directly through pasture walks, meetings, classes, workshops, one-on one consultations, farm visits, etc., based on reported attendance at each event (some farmers may have attended more than one event)
- 72 pasture walks occurred during the grazing season
- 20 winter meetings or workshops were held
- 100 grazing plans were written for 10,000 acres of planned managed grazing lands; see also www.wi.nrcs.usda.gov for annual NRCS reports
- Thousands of people were introduced to managed grazing through targeted print, television, radio, and internet publicity

Converting cropland to managed pastures offers conservation rewards including reductions in soil erosion, nitrate and phosphorus runoff to surface water and groundwater, and sediment runoff into streams. The environmental benefits resulting from the used of managed pastures have not been assessed for the whole state, although they have been measured in some regions. An upcoming report by the UW-Madison Center for Integrated Agricultural Systems on the environmental impacts of managed grazing in Wisconsin will address these conservation benefits.

Each of the GLCI-funded **research** projects described here generally took place from 2003-2005 and had a unique outreach component, purpose, and goals. Projects were selected because of their relevance to graziers' expressed needs, benefits to conservation efforts and the environment, and the integration of producers and supporting agencies into their work. Taken together, the research projects:

- Involved 20 farms using managed grazing and two research stations as sites for experiments
- Tested 24 different kinds of pastures in managed grazing systems, including grasses and grass-legume mixtures
- Found that managed pastures leached less nitrate into groundwater than conventionally cropped fields
- Determined that application of nitrogen to pasture in early May or early August more effectively increased dry matter yields than mid-June application
- Measured increases in pasture yield and root health following outwintering and fallowing (rest) of paddocks

The success of these research and education projects can be measured qualitatively, as well as quantitatively. The following themes expressed by the project leaders and participants are key to the future success of programs and activities that support managed grazing:

- These projects were most successful when farmers shared knowledge, information, skills, and techniques with other farmers
- Public events and media coverage of these projects increased general awareness of managed grazing farms and their many benefits to Wisconsin's rural landscape, communities, and economy
- Managed grazing has been brought to a mainstream level of recognition and acceptance in many parts of Wisconsin
- More work is needed to spread the word about managed grazing at high schools, in regions of state with less active grazing networks, and among farmers who are not currently aware of its potential and benefits
- While the use of managed grazing continues to grow in Wisconsin, change in rural communities often takes place one farmer and one grazing plan at a time

Many farmer grazing networks were built and championed by early adopters of managed grazing, and have since evolved and gained new leaders. This longevity indicates Wisconsin producers' high level of interest in grazing. These networks are helping the next generation of graziers sustain their farms, livelihood and land through managed grazing.

Looking toward the future

Although much progress has been made through the efforts of the participants in these GLCI-funded projects, there is more to be done. Wisconsin lacks a clear, accessible, viable career pathway for entering farmers, even for those farmers opting for low-capital, low-input managed grazing systems. While the GLCI program has supported several grazing schools for beginning farmers over the past decade, the opportunities for farmers to find and afford working farms have not kept pace with these educational activities or the number of people wishing to farm.[1] The problems, which are not limited to graziers, include the rising price of land, development pressures from urban areas, the high cost of livestock, and fluctuating prices for milk, beef, and other commodities.

Ways to overcome barriers to entering, or transitioning to, managed grazing include the development of regional financial transition teams, increased participatory research in managed grazing, and the expansion of equity building opportunities for beginning farmers. Detailed recommendations are presented in a 2006 publication by the Michael Fields Agricultural Institute.[2]

Recent developments offer hope to both new and experienced Wisconsin graziers. These include the hiring of additional grazing specialists so that each region of the state is now covered, the creation of a specialist position in grazing and organic agriculture at the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), the availability of support through DATCP's Grow Wisconsin Dairy Initiative for farmers transitioning to managed grazing, the USDA Environmental Quality Improvement Program (EQIP) for farmers to create and implement managed grazing plans, the establishment of incubator farms where beginning farmers manage dairy herds while being mentored by experienced graziers, the community-based creation of the Dairyland State Academy training facility in Wausau, and the availability of federal funding for grazing research through the UW-Madison Center for Integrated Agricultural Systems (CIAS). The CIAS grazing program, with research grants offered in coordination with the GLCI, has increased University of Wisconsin research on pasture-based livestock production and supported publications on the status and economics of managed grazing.

Several GLCI grant recipients have worked together to coordinate educational offerings and increase the size of their target audience through a distance education program offered by the Wisconsin School for Beginning Dairy and Livestock Farmers (WSBDF). Through this effort, the WSBDF pasture-based dairy and livestock seminar was offered at facilitated sites in Wausau and Reedsburg, in addition to the Madison campus, in 2006-2007. This successful pilot project forged new links between UW-Madison, UW-Marathon and MATC-Reedsburg, and networked new graziers in these communities with grazing specialists and experienced farmers. As the program expands to include

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[1] See also the Farm Link program matching entering and retiring farmers, Farm Center, Wisconsin Department of Agriculture and Consumer Protection, 800-942-2474, http://www.datcp.state.wi.us/mktg/agriculture/farm-center/transfers/farm_link.jsp

[2] Merrill, Jeanne. *The Future of Managed Grazing: Barriers to managed grazing in Wisconsin and how to overcome them.* Michael Fields Agricultural Institute, East Troy, WI. July 2006.

more sites in 2007-2008 and beyond, it will continue to educate and mentor farmers who otherwise might not seek post-secondary education or learn about managed grazing.

The recent formation of several companies producing and marketing pasture-based meat and dairy products is the result of coordinated activity and active participation by Wisconsin graziers. These efforts have resulted in pasture-based products for sale online and on grocery store shelves, reflecting increased consumer awareness that eating grass-fed meat and dairy products has implications for their health, the environment, and Wisconsin's communities.

Managed grazing is a vital piece of the larger puzzle of agriculture, conservation, and land use in Wisconsin. Increasingly, state and national projects are engaging a wide range of stakeholders in conversations about grazing and management of our working lands. These projects include the Working Lands Initiative recently completed by DATCP, the year-long Future of Farming and Rural Life project, various initiatives addressing the 2007 Farm Bill, the Mississippi River Basin Green Lands, Blue Waters project, the national USDA Sustainable Agriculture Research and Education (SARE) conference held in Wisconsin in 2006, and the participation of Wisconsin graziers in the national Beginning Farmer and Rancher Committee. Projects that directly increase and enhance managed grazing lands, such as the ones described in this report, contribute to shaping the future of Wisconsin's agriculture, rural landscape and natural environment.

Terms

Managed grazing refers to a method of feeding livestock by rotating them through a series of subdivided pastures (*paddocks*). The pastures are maintained at a high nutritional quality for the animals by the alternate harvesting (grazing by livestock or machine clipping) and rest and re-growth periods.

Pastures used for managed grazing usually contain a mixture of grasses (native and/or seeded varieties) and *legumes* (such as red or white clover varieties, alfalfa, birdsfoot trefoil and others).

Graziers are farmers who rely on managed pastures as the primary source of forages for their livestock during the grazing months.

A *pasture walk* commonly refers to a gathering of farmers and others on a farm using managed grazing. At a typical pasture walk, the host farmer(s) take guests on a walk through their pastures and facilities and discuss current practices, experimental approaches, and other farming topics related to their enterprise.

Wisconsin has a number of regional *grazing networks* that consist primarily of farmer members as well as university and agency personnel.

A *528a managed grazing plan* is a detailed report specific to an individual farm that outlines the objectives, soil types, and paddock, water, and fencing systems that a farm enterprise will use as part of its management and conservation plan.

The *Environmental Quality Incentive Program* (EQIP) provides cost-sharing funds for a variety of agricultural practices that meet environmental goals, including adopting and implementing a managed grazing plan.

Establishment of a southeastern Wisconsin grazing network

Summary: This grant supported the formation of a new grazing network in a previously unserved region. The goal was to provide educational opportunities and facilitate communication between farmers who used managed grazing or wanted to learn about it. The Southeastern Wisconsin Grazing Network provided technical assistance, cost-sharing information, and coordination with other networks across the state. Some of the activities designed to assist new graziers included seminars, pasture walks, on-farm visits to write and implement grazing plans, distribution of a newsletter, and practical workshops.

Description of activities: This network conducted numerous activities for farmers, agency personnel and the public during 2002 and 2003. In 2002, pasture walks were held at a managed grazing dairy which had transitioned from conventional, an organic dairy farm which also direct marketed grass-fed beef, poultry and cheese, and a sheep grazing farm which was expanding to include heifers. Pasture walks typically drew 20-35 attendees, the majority of whom were farmers.

In addition, the network held educational seminars. A January, 2003 meeting on getting started with managed grazing featured NRCS Grazing Specialist Brian Pillsbury, who spoke about fencing and watering systems for grazing farms, and UW-Madison economist Tom Kriegl, who spoke about grazing farm profitability. In the early spring, there was a hands-on forage identification workshop which included seed selection, pasture renovation, and planting.

The project coordinator evaluated the program by attending and observing the events, as well as handing out short surveys before and after some of the meetings. This information was used to plan additional events on topics in which the audience was interested. The project initiated a newsletter called *Greener Grass*. This newsletter was distributed to 80 people on the mailing list, including about 65 farmers. The network continues in 2007 as the Walworth County Graziers and is coordinated by Peg Reedy.

Highlights: This project resulted in well-attended pasture walks and an enthusiastic information exchange between farmers about managed grazing practices and benefits, particularly environmental benefits. It involved many new farmers with small acreages and farmers with a variety of livestock: dairy cows, beef, sheep, horses and goats.

Project leaders and contact information: Margaret (Peg) Reedy, UW Extension Agriculture Agent, W3929 Cty Rd NN, Elkhorn, WI 53121, 262-741-3181, peg.reedy@ces.uwex.edu

Primary audience and participants: Livestock producers in the southeastern counties of Wisconsin. Some of these producers were experienced graziers; others were unaware of or uncertain how to apply managed grazing practices. The project also worked to educate agency personnel and the public about managed grazing.

Wisconsin: The state of grazing

Summary: This grant is a primary source of support for GrassWorks, Inc., an information and networking organization for livestock grazing activities in Wisconsin. GrassWorks provides information about managed grazing to farmers, educators, conservation and agency personnel, and the general public. It offers an annual statewide conference, a website, several one-day workshops throughout the year, provides literature at various agriculture conferences and events, and coordinates with grazing networks and specialists.

Highlights: According to their website, "GrassWorks is a membership association that links farmers through local networks and provides leadership, education, and research support to promote grass-based farming." One of the organization's stated goals is to increase the number of successful graziers in Wisconsin.

Project leader and contact information: Paul Nehring, Director, GrassWorks, Inc., 210 River Dr., Wausau, WI 54403, 715-261-6009, mail@grassworks.org

Primary audience and participants: Largely intended to inform and network farmers, GrassWorks also provides information and services to educators, agency personnel, policy makers, land owners, consumers, future farmers, and the public in Wisconsin and worldwide.

Description of activities: One of GrassWorks' biggest and best-known activities is the annual three-day, statewide Wisconsin Grazing Conference. Held for the past 15 years, these conferences draw 300-400 participants each year and provide speakers and information from around the state, nation, and world. At these conferences, graziers and other interested farmers, agency and university personnel, consultants, and agricultural industry professionals network and share information, advice, and technical expertise. The Wisconsin Grazing Conference publicizes managed grazing through newspaper coverage of the conference.

GrassWorks has helped coordinate additional workshops based on producer interest and needs. These have included topics such as grassfed beef production and marketing, livestock grazing behavior, grassfed poultry, and farm financial management tools. GrassWorks supports individual networks, especially those that are emerging or reorganizing, with coordination, contacts, and suggestions from successful grazing networks around the state.

GrassWorks has helped Native American tribes in Wisconsin establish managed grazing systems for beef and bison farms through workshops and visits to their farms. GrassWorks also communicates with NRCS, university, and land conservation staff to address nutrient management standards for grazing farms. Creating public awareness of the benefits of managed grazing to garner support for grazing farms, farmers, and products is another goal of GrassWorks. This organization promotes grazing practices and educates the public about the advantages grazing provides to farmers, the environment, animals, consumers, and communities.

Northwest Wisconsin Graziers Network

Summary: This project set out to successfully re-establish a Northwest Graziers Network and increase farmer involvement and leadership roles. During the grant period, a pilot concept of a "Master Grazier" modeled after UWEX Master Gardener program was initiated. By 2004, five area farmers completed this training and have been available as mentors for beginning graziers. While project staff have not found a need to train additional mentors, the willingness of the existing Master Graziers to speak about managed grazing and help coordinate network activities has been an asset. The Northwest Graziers Network holds about one pasture walk per month during the grazing season and has established a regular winter meeting in February.

Description of activities: This area had a grazing network that became inactive. Consequently, the grant was used to connect UW-Extension and county conservationists with graziers and rebuild the network. The coordinators focused on grazing education, including how to effectively apply for and implement EQIP funds and conservation methods. They also worked on improved co-ordination between counties and the development of relationships between graziers. In order to increase farmer-to-farmer learning about practical aspects of grazing, the idea of Master Grazier training was piloted. Several experienced graziers in the area were invited to participate, and they each undertook training which included attending Wisconsin Grazing Conference sessions and becoming familiar with books and references from a portable library of managed grazing resources. These graziers have been available for phone and farm visit consultations with area farmers who have questions about managed grazing, but have not been utilized as much as the project coordinators anticipated.

The Northwest Graziers network holds four to five pasture walks each grazing season at a variety of managed grazing operations including, in 2007, dairy cow and dairy sheep farms, an organic grazing farm, a beef operation, and a horse farm. The network is also becoming active in improving marketing opportunities in the region, including seeking a local meat processor and working on getting a goat milk pickup.

Highlights: The network grew to a mailing list of over 670 people in 2007. It is an active, diverse group of farmers in a six-county region of NW Wisconsin. A leadership group of farmers plans network activities, pasture walks, and the annual winter meeting. Recently, this network teamed up with a regional network of direct food marketers to host an event that drew 80-90 people. They were also pleased to host one of the WI Grazing Schools workshops (see page 19) in 2006.

Project leaders and contact information: Otto Wiegand, UW-Extension Dairy and Livestock Agent, 850 W. Beaver Brook Ave., Spooner, WI 54801, 715-635-3506, otto.wiegand@ces.uwex.edu; and Tim Jergensen, UW Extension Agriculture Agent, 330 E. LaSalle Ave., Rm 2206, Barron, WI 54812, 715-537-6250, tim.jergenson@ces.uwex.edu

Primary audience and participants: Farmers using, or wanting to use, managed grazing with any of a variety of livestock, particularly in the northwestern counties of Wisconsin.

Advocating grazing in east central Wisconsin

Summary: The East Central Wisconsin Grass Farmers Association contacted all area farmers using managed grazing (nearly half not with the network), developed newsletters, held field days and workshops, and publicized events. The association also provided on-farm technical assistance to graziers, including helping with the development and writing of grazing plans.

Highlights: The coordinator thought that the many farmer interactions and information distributed were valuable to increasing grazing knowledge in the east central Wisconsin and would not have been possible without the grant. Glacierland RC&D has maintained its commitment to managed grazing as a resource conservation tool and an environmentally friendly farming system.

Project leaders and contact information: Greg Hines, Director, Glacierland RC&D, 3086 Voyager, Dr., Suite 1, Green Bay, WI 54311, 920-465-3006; and Rick Adamski, grazing specialist, W2407 Hofa Park Road, Seymour, WI 54165, 920-833-6704

Primary audience and participants: New and established grazing farmers in thirteen east central counties, agency and conservation personnel, students attending Lakeshore Technical College (LTC), and the Oneida Nation.

Description of activities: Area farmers have shown a strong interest in managed grazing, but there has not been enough organizational support for education and implementation of grazing practices. A directory of area farmers interested in grazing was established in a previous project. LCD, NRCS, and UWEX worked together to support a part-time grazing specialist, hired by this grant. This coordinator organized and attended pasture walks and attended them to spread the word that he had been hired to offer grazing assistance to farmers in the region, plus the Oneida Nation.

In total, about 600 people attended 22 pasture walks during the time that the grant supported the coordinator. He also consulted on farm with 27 farmers about pasture and livestock management issues related to grazing. He distributed 40 beginning grazier booklets and about 50 NE Wisconsin grazing directories to farmers that he consulted with and people who attended pasture walks. The coordinator spoke at 21 meetings about the project and managed grazing.

Some of those meetings helped to inform other agencies and their clientele of the resources available, such as an Ag Extension meeting for graziers, a District Conservation area meeting, and LTC managed grazing classes. He also tested and analyzed pasture software and measurement tools to monitor pasture condition (GPS, a floating plate meter, and a paper "report card" type assessment tool). He recommended to farmers who weren't using any measurement tools to utilize one of these methods to gauge pasture productivity and animal intake in order to improve their management and bottom line.

Coulee Graziers managed grazing education program

Summary: This grant continues a highly successful, farmer-driven program that has been educating farmers and citizens about managed grazing since 1994. The Coulee Graziers network in west central Wisconsin is funded by this project which supports a coordinator and provides technical, educational, and community outreach services. Among its many activities throughout the year, the network conducts pasture walks, winter discussion groups, promotion of grazing events and managed grazing farms, television programs on specific managed grazing topics, and workshops. The network coordinator also helps to develop individual grazing plans for farms and provides on-farm technical assistance.

Description of activities: The coordinator and farmers involved with this network undertake many activities throughout the year that educate, inform, assist, and develop managed grazing in the region. For example, in 2003 the network held eight pasture walks on farms in Buffalo, La Crosse, Monroe, Trempealeau, and Jackson counties which were attended by over 150 producers. In addition, the network organized six grass series walks, which were specialized pasture walks for those interested in delving into the performance of different pasture plants. One farmer grew 24 different varieties of grasses for pasture walk attendees to look at and evaluate for growth and performance.

The network coordinator wrote 16 grazing plans for over 1,300 acres of managed pasture in 2003. An additional 11 grazing plans received follow up and changes, if needed, covering another 450 acres. Whether to write a grazing plan, answer questions, or advise on techniques, the coordinator made farm visits throughout the primary five county region covered by this network, provided phone consultations, distributed informational materials and taught four WWTC adult agriculture education classes during the year. Over the winter months, the network organized six discussion groups with more than 140 producers in attendance, meeting in homes or in the Taylor Community Center. The Coulee Graziers also held three educational workshops, featuring prominent speakers such as Jim Gerrish and Karen Sullivan, who spoke about topics of high interest to graziers and drew 50-60 farmers per workshop.

Highlights: Going above and beyond pasture walks, workshops, and on-farm assistance, the Coulee Graziers produced and aired four TV programs with specific managed grazing topics on Trempealeau County Community TV and Eau Claire County public access, delivering to an audience of over 80,000. The Coulee Graziers' activities are also routinely announced in local newspapers, and a network grazier's operation was profiled in the *Country Today*.

Project leaders and contact information: Mary C. Anderson, RC&D Grazing Specialist, 19225 Dewey St., PO Box 645, Whitehall, WI 54773, 715-538-4396; and Patricia Kling, project manager and coulee grazier, W15307 Wilson Rd., Taylor, WI 54659, 715-662-5053

Primary audience and participants: Farmers practicing managed grazing or interested in learning more about managed grazing located in a five county area covered by the River Country RC&D.

Moving beyond the basics of managed grazing

Summary: This project was directed toward the expansion of a grazing education program in the south central region of Wisconsin. It focused on improving graziers' skills, understanding the environmental benefits of managed grazing, and facilitating communication via a multi-network newsletter. The project promoted farmer learning and skill development in managed grazing, increased communication, provided mutual teaching opportunities for farmers, and organized on-farm demonstrations. The focus was to improve management skills to increase pasture productivity and realize the environmental benefits of grazing systems. Much of this information sharing and discussion took place at pasture walks and during winter meetings.

Highlights: "I think the most positive experience resulting from this effort has been the evolution of managed grazing from a 'fringe' idea practiced by a handful of farmers to a commonplace and increasingly popular practice in this area," said Laura Paine, project leader.

Project leader and contact information: Laura Paine, (formerly UW-Extension agent, Columbia county), currently Grazing & Organic Agriculture Specialist ,WI Dept. Agriculture, Trade and Consumer Protection, PO Box 8911, Madison, WI 53708, 608-224-5120, laura.paine@datcp.state.wi.us

Primary audience and participants: Livestock producers in the south central region of Wisconsin interested in or practicing managed grazing.

Description of activities: This project improved the capacity of the Columbia-Dodge Grazing Network to provide more in-depth information and demonstrations about managed grazing practices. The network held sixteen pasture walks (averaging 30 attendees each) over the three-year grant period. These walks featured many producer practices, from building low-cost milking parlors to pasture renovation to ration balancing. Three winter meetings, each detailing specific topics in managed grazing, were held and attended by 30-60 participants per meeting. Several farms experimented with kura clover establishment for an on-farm demonstration project, trying different methods and evaluating their outcomes. A survey of 20 grazing network members indicated that the programming increased their awareness of pasture management issues and often translated into knowledge and skills they could apply to their own farms.

The project coordinator specifically sought to increase communication and information sharing by holding monthly pasture walks, organizing several workshops and conferences, sending pasture walk announcements, and creating a *South Central Grazing News* newsletter. The mailing list for the newsletter grew from less than 200 to nearly 600 farmers by 2004. Despite the emphasis on expanding managed grazing knowledge and skills among existing graziers, an influx of new farmers led to the development of more programs covering basic information, such as seeding new pastures and writing grazing plans.

North Central Graziers managed grazing education and demonstration

Summary: The North Central Graziers network, in association with the Pri-Ru-Ta RC&D, conducts education and demonstration activities on managed grazing farms in the region, provides one-on-one phone consultations and farm visits, and assists with the writing and implementation of managed grazing plans.

Description of activities: The purpose of this grant was largely to continue the work in Taylor and surrounding counties (see 'Transfer and/or Transition…' project on page 20) to help farmers make the transition to managed grazing. Pasture walks were the main way of reaching producers and providing a venue for them to exchange practical information. Monthly pasture walks were held throughout the summer of 2004, with 15-50 people (mainly farmers) attending each walk. The grazing specialist attended and also conducted follow ups with farmers, many of whom had "changed the way they managed their property" after attending a pasture walk.

The grazing specialist conducted many on-farm visits to look at and discuss specific questions and ideas relating to managed grazing. In addition to those who wanted grazing plans, nearly 30 producers wanted to discuss techniques during on-farm visits and participated in the network because of the individual attention made possible by the grant. A number of producers adopted managed grazing without wanting a written plan.

The specialist also educated local business representatives about managed grazing and its benefits to the community, environmental quality, and the quality of life of farmers. Due to this outreach, the specialist saw more participation by community members in pasture walks and made inroads to obtaining future support, including financial support, for education and demonstration events.

Highlights: Through 2004, this grazing group held 72 pasture walks and 12 winter meetings, and had about 14,000 acres in managed grazing, representing about 20 percent of farms in the area. The activities of the network and grazing specialist continue in 2007 with about two pasture walks per month, 35 grazing plans in the process of being written, and an annual winter conference, which drew over 100 participants in 2006.

Project leaders and contact information: formerly Adam Abel, now Bob Brandt, Pri-Ru-Ta RC&D, 925 Donald St., Medford, WI 54451, 715-748-2008

Primary audience and participants: Individual assistance to farmers, particularly those converting to managed grazing, in the north central counties of Wisconsin. The network also seeks to educate area agricultural representatives about the benefits of managed grazing.

One-on-one grazing education assistance program

Summary: The purpose of this project was to hire a grazing specialist to assist graziers in the seven county area of the River Country Resource Conservation & Development Council due to the high demand for services there. The experienced and highly effective grazing specialist funded by this grant provided on-farm technical assistance, completed numerous grazing plans, assisted farmers in the Chippewa Valley Graziers Network, helped plan and coordinate pasture walks and winter meetings, and provided educational materials to farmers. Due to the large amount of managed grazing activity in this area, NRCS has subsequently hired an additional grazing specialist to work out of their Altoona, Wisconsin office.

Highlights: The activity of the Chippewa Valley Graziers network and the grazing specialist funded by this project surpassed the target goals in terms of numbers of farmers assisted and acres put into managed grazing plans. In 2003, the specialist made over 60 on-farm visits and 125 phone calls; trained two land conservation staff, two NRCS soil conservationists, and a summer intern on 528A prescribed grazing plans; and wrote 19 new grazing plans representing over 1,350 additional acres put into managed pasture lands.

Project leaders and contact information: James Hartung, past-President (retired) and Edward Weber, President, River Country RC&D Council, 1304 N. Hillcrest Pkwy, Suite B, Altoona, WI 54720, 715-834-9672, www.rivercountryrcd.org

Primary audience and participants: Producers in the seven county area covered by the River Country RC&D in west central Wisconsin.

Description of activities: The River Country RC&D has provided grazing education and assistance since 1999 through grants such as this one. The conversion of area dairy farms to cropping systems led to increased soil erosion and sedimentation in regional watersheds. Thus, county land conservation and natural resources staff saw a need for increased education and support of farmers for managed grazing. Local demand for education and technical assistance surpassed current agency staff capabilities (NRCS and UW-Extension), therefore GLCI funds were sought and obtained to hire a grazing specialist. The activities by the specialist have primarily consisted of individual farmer education and writing of grazing plans, organizing and attending pasture walks, making conference presentations, and obtaining media coverage of managed grazing events and farms. More than 60 farm visits were made, and the specialist assisted 20 beginning farmers with four or more farm calls each to help them learn, understand, and begin to implement grazing 528A plans. The network also distributed beginning grazing manuals, MN (advanced) planning guides, and other grazing publications for farmer education and reference. Newspaper articles were actively promoted in order to inform the public about managed grazing, including a photo-journal essay in the *Leader-Telegram* about a long-time grazier in Eau Claire County.

Promotion and implementation of managed grazing

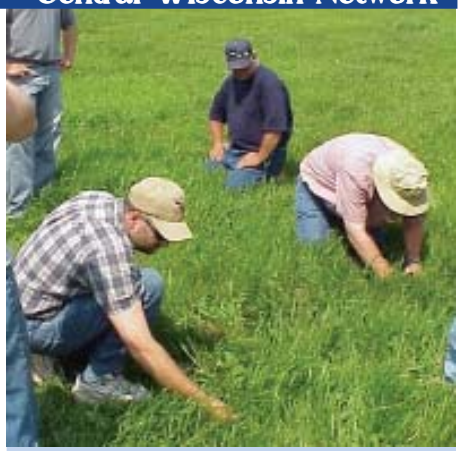
Summary: This project was in response to increasing numbers of requests for assistance with managed grazing in the dairy region of Lincoln and Marathon counties. Assistance was provided for individual farm plans, summer/seasonal pasture walks, winter farmer meetings on selected topics, press releases, and other educational events.

Description of activities: The Central Wisconsin River Graziers Network, along with LCD and Extension staff, provided planning and technical assistance for farmers wanting to implement managed grazing. Pasture walks, winter meetings, press releases and education of agribusinesses about the benefits of managed grazing were included. The network has grown to include about 200 active graziers, with about the same number of farmers interested in managed grazing.

In 2003, activities included 15 pasture walks and winter discussion meetings primarily for farmers, and also for agency personnel. An estimated 410 farmers and 40 other agricultural professionals came to these events. The network held a winter conference, with about 80 farmers in attendance. In 2003, 14 announcements and newsletters were mailed to farmers, agency personnel, and newspapers. The network has 820 addresses on its mailing list.

The technical service provider working with this network and the Lincoln and Marathon county LCDs wrote 180 grazing plans from 1998-2004 that covered a total of 13,280 acres. Follow-up work has seen 8,300 acres of grazing plans implemented, with ongoing efforts adding acres in managed pasture each year. Most acres put into managed grazing have been converted from cropland to pasture, and some are converted from unmanaged to managed pasture. Farmers need quality technical assistance throughout this two- to three-year transition process to design and implement correct practices to run a successful managed grazing farm.

GLCI funds contribute significantly to this ongoing effort, which also has a financial commitment from county LCDs and additional funds for cost-share of managed grazing systems from the state DATCP. Without these partnerships, the level of support for managed grazing, and lands conserved and utilized by this important management tool, would decline.



Highlights:

- 180 grazing plans were written from 1998-2004 that covered a total of 13,280 acres
- 8,300 acres of grazing plans were implemented from 1998-2004
- The farmer network of graziers grew to about 200 active members

Project leaders and contact information: Paul Daigle, Conservation Specialist, 210 River Dr., Wausau, WI 54403, 715-261-6006,padaigle@mail.co.marathon.wi.us

Primary audience and participants: Dairy and livestock producers in Lincoln and Marathon counties, agency personnel, agribusiness professionals, and press.

Highlights: The 2006 winter meetings of the Southwest Wisconsin Grazing Network were structured as a four-part discussion series with an expert speaker on a specific topic in beef, dairy, or pasture management at each session. These two-hour discussions took place monthly from December through March and were extremely well-received by farmers and speakers alike, producing vigorous discussion and a great deal of information sharing.

Project leaders and contact information: Rhonda Gildersleeve, Iowa County Agriculture Agent, 222 N. Iowa St., Dodgeville, WI 53533, 608-935-0391, rhonda.gildersleeve@ces.uwex.edu; and Steven Bertjens, Southwest Badger RC&D, 150 W. Alona Ln, Lancaster, WI 53813, 608-723-6377, steve.bertjens@wi.usda.gov

Primary audience and participants: Livestock producers and landowners in a six county area of southwestern Wisconsin using or interested in finding out more about managed grazing.

Southwest Wisconsin grazing initiative

Summary: This project was a cooperative effort between the SW Badger RC&D and Iowa County UWEX to provide grazing educational activities including pasture walks and winter meetings. The grant was also used to hire a grazing specialist in the RC&D office to provide additional on-farm support and to write and implement grazing plans. The specialist started in early 2004 and is still active in 2007, writing plans for a variety of sizes and types of livestock operations. The Iowa county extension agent provides a lot of one-on-one farm site support addressing questions about managed grazing, as well as organizing monthly pasture walks for the Southwest Wisconsin Grazing Network. The network has an annual winter conference or, in 2006, a discussion series, that is devoted to particular topics of interest to area livestock farmers using managed grazing.

Description of activities: The grazing network activity in the southwestern region of the state is spread across several farmer networks, with Vernon, Richland, Sauk, and Crawford counties having distinct networks but sharing grazing specialist activity out of both the Southwest Badger RC&D (Platteville) and the Southwest Area NRCS (Richland Center) offices. Meanwhile, the SW Grazing Network encompasses primarily Iowa, Lafayette, and Grant counties, although it also sends out an annual mailing of all southwestern Wisconsin grazing network schedules in the spring.

The SW Wisconsin Grazing Network holds at least monthly pasture walks throughout the grazing season on dairy, beef, and sheep farms using managed grazing. These pasture walks are advertised in local newspapers and on the radio, drawing interest beyond those already on the mailing list. On-farm workshops are also held, featuring such topics as how to plan and build effective fencing and watering systems for paddocks in a managed grazing operation. Annual winter meetings have grown to draw about 70 attendees and cover grazing related topics in more depth. With two grazing specialists in the southwestern region and follow-up technical support and implementation by the Iowa and Crawford county extension agriculture agents and others, managed grazing continues to thrive in this area. Notably, with an influx of new landowners, the need for basic land use and pasture management information in this region of the state continues to increase.

Central Wisconsin Beef Graziers

Summary: Through educational efforts such as pasture walks, classes, and individual contacts, this network is a resource for cow-calf and stocker beef farmers. Network goals include increasing the use and acreage of managed grazing for beef. The network has been especially interested in helping farmers experiment with new forage varieties and techniques such as low-cost pasture renovation, various seeding methods, and looking at the feed quality of pastures which are saved for winter grazing (stockpiling).

Description of activities: Beef producers receive relatively small returns per animal and often have limited capital for improving pasture productivity and quality. Renovation or other pasture improvements have to show quick payback in animal performance and forage yield to be viable tools for most beef producers. In addition, several network producers are located in priority watersheds and are switching to grazing because of the high erosion potential of their land. Crop lands converted to managed grazing are expected to benefit from reduced soil erosion, decreased runoff potential, building of dense sods with higher organic matter content, and stream bank improvements. The Central Wisconsin Beef Graziers network helps established producers share information and experiment with better pasture management. The network also focuses on bringing in new producers and mentoring them, providing advice and assistance.

The network is particularly active in helping beef producers apply for and implement EQIP grants to establish pastures using managed grazing. Nearly 40% of members' pastures have been converted from cropland, while many existing pastures were improved with better management. These beef producers have implemented managed grazing plans that require a minimum livestock rotation schedule of every six days, with daily or twice daily rotations preferred and used by some producers.

The network communicates through a direct mailing list of about 220 beef producers in the seven county area, as well as newspaper and online announcements, particularly the GrassWorks website. The network holds seasonal pasture walks and on-farm demonstrations, as well as winter meetings on various topics of interest to the group. The project staff call and visit producers interested in setting up managed grazing on their farms.

Highlights: With network assistance and EQIP funds, participants implemented grazing tools such as fences, watering systems, and lanes on nearly 1,000 acres from 2002-2006. The network continues to have an active membership of beef producers in 2007, with operations ranging from five to 250 cows.

Project leader and contact information: Keith VanderVelde, UW-Extension Livestock Specialist, 480 Underwood Ave., Montello, WI 53949, 608-297-9153, ext 4, keith.vandervelde@ces.uwex.edu

Primary audience and participants: Producers with beef cow-calf and stocker beef farm enterprises in seven counties of the Central Sands area of Wisconsin.

'Seeing is Believing' bus tour

Summary: This proposal supported a bus trip for new or transitioning graziers from southeastern Wisconsin to visit three established managed grazing farms. In particular, farmers applying for EQIP funds to develop grazing plans were skeptical about whether their livestock would obtain enough feed from grazing managed pasture. Experienced graziers effectively explained the EQIP cost-sharing program, grazing plans, grazing layout and design, livestock stocking rates and rotations, and other practices to interested farmers. Reviews from farmers who went on the bus tour were very good.

Description of activities: The southeastern region of Wisconsin is highly developed but also has many new, smaller farms, often managed by inexperienced farmers. GLCI funded the startup of a new grazing network in this region at the same time the Town and Country RC&D was formed for the southeastern thirteen counties of the state. These organizations jointly planned the bus tour, which visited three successful managed grazing farms in one day. Additional network members experienced with managed grazing showed up at the farms to offer their comments and answer questions of those on the bus tour.

The first farm on the tour was a natural beef operation using managed grazing, and the second was a grazing sheep farm. The third was a managed grazing dairy farm working with a specialty cheesemaker. This partnership yields an award-winning, high-end cheese made solely from the grazed cows' milk produced by the farm during the grazing season.

Highlights and quotes: The theme of the bus tour was "farmers learning from farmers." The farmers on the tour asked "tons of questions" of the host farm families, who were extremely willing to share practical information and their experiences. The project leader was aware of four participants who have since started some grazing after the bus tour. For example, one participating conventional dairy farmer is now using managed grazing for his dairy heifers.

Project leaders and contact information: Margaret (Peg) Reedy, UW Extension Agriculture Agent, W3929 Cty Rd NN, Elkhorn, WI 53121, 262-741-3181, peg.reedy@ces.uwex.edu

Primary audience and participants: Farmers who were just starting farming or were considering using managed grazing were invited and encouraged to attend. Fifteen farmers and four agency personnel went on the bus tour.

Improving grazing education in south central Wisconsin

Summary: This project supports a two-credit program of managed grazing instruction offered by MATC in coordination with county agricultural agents and UW Extension staff. The program consists of classroom instruction and field study, and is designed to address obstacles typically perceived by farmers to the entry or transition to managed grazing. Impediments to using managed grazing can include current farm layout and equipment usage, profitability concerns, reluctance to change management, and a lack of understanding regarding particular techniques. These topics and specific managed grazing practices are taught during the classes and shown in practice at subsequent farm tours (pasture walks) during the spring and summer.

Description of activities: The classes take place at MATC-Reedsburg, providing eighteen hours of classroom instruction over the course of two to three winter months. Various speakers present topics related to managed grazing, including perceived obstacles to using or transitioning to grazing. Presentations are given by farmers, NRCS personnel, UW-Extension agents, and others. Specific topics covered during the session range from details of pasture management, layout and design to explaining the economic benefits of low-cost managed grazing systems. Other positive features of managed grazing discussed in the classes include environmental benefits, reduced use of fuel and fertilizer, and improved livestock health. Students receive two credits for the program and tuition support is offered through the grant.

During the spring and summer months following each session, students are invited to, and sometimes host, pasture walks at grazing farms, in coordination with the area graziers network. The beginning farmers found the information and advice of the experienced graziers at these events to be highly valuable. A mailing list of area farmers is maintained to facilitate communication of pasture walks and other events of interest.

Highlights: This series of grazing classes began in 2003 and has continued to draw approximately 12-20 students each winter through 2007. In 2003, 10 of the 12 farmers who took the course implemented grazing plans on their operations. Past attendees have included young beginning farmers, women, Amish, and many farmers with no previous knowledge of managed grazing practices.

Project leader and contact information: Doug Marshall, Farm Business and Production Management Instructor, MATC-Reedsburg, 300 Alexander Ave., Reedsburg, WI 53959, 608-524-7727,dmarshall@matcmadison.edu

Primary audience and participants: The program is directed toward farmers in the surrounding four county area. Some students already coming to MATC also become interested in the grazing curriculum.

Highlights: As of 2007, 230 students have participated in the program. Three-quarters of WSBDF graduates are farming, and nearly half of them have started their own farm business. About two-thirds of graduates who are dairy farming use managed grazing. Student reviews of the program are positive. Many students attribute their ability to enter farming and farm profitably to the WSBDF.

Project leader and contact information: Richard Cates, WSBDF Director, Center for Integrated Agricultural Systems (CIAS), UW-Madison, 1535 Observatory Dr., Madison, WI 53706, 608-265-6437 or 608-588-2836, rlcates@wisc.edu

Primary audience and participants: Beginning farmers, particularly those who want business planning and pasture management training, and individuals who want to start farming. Instruction is centered in Madison, WI as part of the Farm and Industry Short Course program at the University of Wisconsin-Madison. Most students are on campus; however, distance education and self-study programs are available.

The Wisconsin School for Beginning Dairy and Livestock Farmers

Summary: The Wisconsin School for Beginning Dairy and Livestock Farmers (WSBDF) helps motivated people start and develop their own farm businesses. The program offers classroom teaching, mentoring, scholarships, farm tours, conference attendance, summer farm internships, and business plan development. The school emphasizes managed grazing as a viable, low-cost strategy for farm startup and operation. In recent years, the WSBDF has highlighted business planning, understanding and serving a market, farm profitability, and enterprise goals, as well as technical and production information.

Description of activities: The core of the WSBDF program is fifteen weekly seminars on topics such as farm business planning, livestock production and marketing, pasture management, nutrition and animal health, and organic farming. These seminars are taught by UW faculty, experienced grazing farmers, area lenders, agricultural professionals, and other successful business leaders. Additional evening classes provide one-on-one training and experience using farm financial management software and business planning tools. At the end of the program, students turn in their completed business plans and have the opportunity to present their plans to a panel of lenders and farmers.

Students participating in the WSBDF gain additional knowledge and make contacts by attending several conferences. Spring and summer on-farm internships are offered following the seminars. The internships provide practical experience in one or more farm settings of particular interest to the students. In addition to the hands-on learning, student interns learn how the mentor farmer thinks, plans, and responds to everyday situations. Interns usually live on the farm and often become connected to area networks.

The WSBDF is offered at two distance education sites in addition to the Madison campus. The curriculum is also available on CD for self study. The WSBDF has reached thousands of Wisconsin residents and people from other parts of the country.

The WSBDF is working to build an endowment from which to fund many of the program activities. While significant progress has been made, the WSBDF still depends on grant money.

Wisconsin Beginning Grazing Schools

Summary: This intensive, two-day workshop was developed and presented in August of 2002 and 2003. Originally held at UW-River Falls, the Grazing Schools have expanded to a series of workshops repeated at several sites around the state each summer. The goal has been to provide a thorough introduction to managed grazing in a short time. Between 20 and 30 participants usually attend each workshop. They are mainly farmers who are new to grazing or are considering making the transition from conventional farming practices. Participant reviews have been favorable. Three schools were offered in 2006 and four will be offered in 2007.

Description of activities: Over two days, the workshops cover a large amount of practical information about managed grazing. The presenters include nutritionists, veterinarians, NRCS grazing specialists, UW faculty, and UW-Extension personnel. They offer high quality, current information about livestock and pasture management. Specific topics have included pasture establishment and improvement, grass and legume species selection and identification, water and fencing systems, and economics. In addition to the supplies used in the classes, reference materials are provided for participants to take home. The workshops are rounded out with visits to the farms of experienced graziers.

This project began with a UW-Extension agriculture agent and a UW-River Falls agronomist combining efforts and offering workshops at several locations in northern Wisconsin. Designed in part to inform and educate producers and agency personnel about cost-sharing opportunities such as EQIP, the Grazing Schools also teach about the environmental benefits of managed grazing with respect to manure management, runoff control, and good streambank management.

These workshops have primarily attracted dairy and beef producers. Participants said they liked learning from their peers during the workshop sessions and farm visits. Several of the attendees have been to subsequent Wisconsin grazing conferences and meetings, or are otherwise visible in the farming community. Between continued demand for workshops and the participation of attendees in grazing networks and other events, it appears that the Grazing Schools are having a positive impact.

Highlights: As project leader Dennis Cosgrove puts it, the annual summer workshops that comprise the Wisconsin Grazing Schools are "designed to teach producers, educators and agency staff the basics of managed grazing with a hands-on approach." These workshops have continued to be popular, with three held in 2006 and four offered at locations across Wisconsin during the summer of 2007.

Project leader and contact information: Dennis Cosgrove, Professor of Agronomy, UW-River Falls, 410 S. 3rd St., River Falls, WI 54022, 715-425-3345

Primary audience and participants: Producers actively farming within the region of the workshop are the primary audience for these training sessions. However, county agents, natural resources personnel, and industry professionals who want to know more about managed grazing are also encouraged to attend.

The transfer and/or transition of farms to managed grazing

Summary: The primary objective of the grant was to provide information and assistance to farmers who were in a position to transition their farms to managed grazing or transfer their farms to graziers. These activities laid the groundwork for a more active North Central Graziers network and introduced dozens of area farmers to the concepts, techniques and environmental and economic benefits of managed grazing. Through the knowledge and personal contacts of the project leader and the enthusiasm and dedication of experienced graziers in the area, the awareness and use of managed grazing in north central Wisconsin has continued to increase.

Description of activities: The purpose of this project was mainly to provide outreach and education to farmers in the area who might not know about managed grazing, but be interested in applying it to their farming operations. Through the contacts and efforts of project manager Gene Sirianni, dozens of area farmers were contacted who were not already members of the North Central Graziers Network. Sirianni was a newly retired farm business instructor from the area technical college and had many contacts from his teaching days, including students and other farmers in the region. The grazing network supported this effort by holding a series of extra pasture walks during 2003 just for transitioning farmers. By invitation and through word of mouth, a number of interested farmers attended. Those who wanted more information and recommendations about their own operations received on-farm follow-ups by Sirianni and other network members.

By the end of this one-year project, Sirianni had started the area grazing specialist on managed grazing plans for about 15 farms. The UW-Extension office provided additional support, including a grazing reference library of books and manuals. The grazing network has grown and become very active since the time of this grant (see also North Central Graziers project on page 11), with established graziers continuing to take leadership roles in publicizing their successful farming methods and being active with statewide efforts to inform and educate farmers and the public about the benefits of managed grazing.

Highlights: Several specific suggestions for beginning graziers emerged from this work, including: "Start grazing as soon as you see green; develop a good livestock lane from the barn to the pastures; plan enough acres of managed grazing to set aside grass for late fall grazing; and limit supplementation of protein during the grazing season because well managed pastures provide more than enough (for dairy cows and heifer growth)."

Project leaders and contact information: Gene Sirianni, Farm Business Instructor, retired, WTCS, Dorchester, WI; now see Bob Brandt, Pri-Ru-Ta RC&D, 925 Donald St., Medford, WI 54451, 715-748-2008; and Glenn Harder, W3042 Trout Ave., Rib Lake, WI 54470, 715-427-3295

Primary audience and participants: Existing farmers whose farms have good potential for managed grazing or transfer to a grazier. Focused on Taylor and three surrounding counties in north central Wisconsin.

Clover Belt young farmer outreach

Summary: This project was designed to familiarize students with managed grazing as a viable, low-cost option for starting farm careers. Area graziers observed that little managed grazing information was offered in high school, and many young people thought that starting a farm was too costly. Teams of two farmers brought a slide show about managed grazing and their own farms to high schools and two farm classes at the Chippewa Valley Technical College. Students later went to a pasture walk. The students enjoyed the experience, and the project leaders noticed that some of the participants started using managed grazing on their farms and continued to be involved in the network.

Description of activities: Farmers from the North Central Graziers Network observed that most young people in their area were no longer pursuing farm careers. Critical factors were thought to be the high cost of land and the capital investment needed for a conventional livestock system. These experienced graziers thought that most high school students and potential farmers were not aware of managed grazing as a low cost approach to starting a farm. In addition, there was little or no grazing information available for classroom use and managed grazing was not covered in the regular agriculture curriculum.

Teams of two experienced graziers went to each school and presented a slide show about managed grazing, followed by discussion. Network members spoke to agriculture classes in ten high schools as well as to 60 CVTC students in two farm classes, including a large contingent of Mennonites. These were well received. Classroom work was followed up with a half-day pasture walk at a grazing farm later in the spring. All participants were invited to future network activities, and several who were particularly interested kept coming to pasture walks. A couple of these individuals have started using managed grazing techniques.

The farmer presenters had a few grazing books and materials that were given to the most interested students and the agriculture instructors. A few agriculture teachers came to additional pasture walks. On the whole, the project reached many people with new information, used the effective technique of direct farmer-to-student interaction, and could easily be repeated with current or updated materials.

Highlights: A group of graziers prepared and presented a slide show which went well and reached many people. The CVTC students were the most responsive, with many already engaged in farming, including a large Mennonite population. Since the high school and technical college agriculture classes turn over every two to four years, this kind of presentation might be valuable to repeat.

Project leaders and contact information: Dick Hughes, grazing dairy farmer, N796 Sunset Dr., Thorp, WI 54771, 715-669-5182; and Dave Mayenschein, grazing dairy farmer, N10473 Dickerson Ave., Thorp, WI 54771, 715-669-3169

Primary audience and participants: About 60 Chippewa Valley Technical College (CVTC) farm class students and agriculture classes in 10 high schools in four north central counties of Wisconsin.

Differences in late season growth of grass species and varieties

Summary: The purpose of this project was to evaluate different species and varieties of grasses that persist and yield well in managed grazing pasture systems under late summer conditions in Wisconsin.

Highlights: None of the species tested for improved late season growth in managed pastures outperformed typical Wisconsin pasture species, such as orchardgrass. Several new varieties showed improved palatability and substantial regrowth at times, but not throughout the full two years of the experiment. Overall, the lack of response in this trial led the researchers to test other species.

Project leader and contact information: Dan Undersander, Professor of Agronomy, UW-Madison, 1575 Linden Dr., Madison, WI 53706, 608-263-5070, djunders@facstaff.wisc.edu

Project location: Three sites: two farms in Dunn County (west central Wisconsin), and the Lancaster Agricultural Research Station, Grant County (southwestern Wisconsin).

Primary audience and participants: Dairy farmers in Wisconsin using managed grazing, agriculture Extension agents, grazing specialists, and agribusiness professionals.

Background: In late summer, the growth of typical Wisconsin pasture grasses slows dramatically due to dry conditions and shorter day length. Graziers cope with this "summer slump" by feeding supplemental forage, reducing stocking rates (number of cattle on a pasture) or grazing more acres of pasture. An alternative strategy is to plant and manage grasses that tolerate hot, dry weather. Establishing these grasses in Wisconsin and getting them to persist through the winter months has been problematic. Some species and varieties of grasses may grow and yield better during the late summer, persist through winter, and be of high enough quality to feed to beef and dairy cattle. Grasses that look promising under controlled experimental conditions do not always hold up in practical field testing, however. This project was designed to test some of these late summer grasses in the pastures of working grazing farms.

Description of activities: In the spring of 2004, plots were seeded at each of the farms with ten different cool season grasses: festulolium, hybrid bromegrass, meadow bromegrass, meadow fescue, mountain meadow bromegrass, orchardgrass, quackgrass, reed canarygrass, smooth bromegrass, and tall fescue. Meadow bromegrass and meadow fescue are widely grown in Canada, while hybrid bromegrass and festulolium have been bred for improved late summer growth.

Each of these grasses was planted in four replications at each site. The plots were grazed with cattle and yield was measured with a plate meter prior to each grazing cycle. Regrowth of plots was measured 30-35 days after grazing.

Results: Preliminary results showed less growth and yield from the tested grasses in late summer than was anticipated. The extremely dry weather in 2005, particularly in southern Wisconsin, strongly influenced the results.

When regrowth was measured on Dunn County farms in September of 2004 and 2005, the typical cool season grasses, such as reed

canarygrass and orchardgrass, produced the greatest yields per acre. The meadow fescue did not establish well in 2004 and produced relatively little regrowth in 2005 on both farms. The hybrid bromegrass and meadow bromegrass kept pace with, but did not exceed, the regrowth of smooth bromegrass.

At the Lancaster Research Station, meadow bromegrass performed exceptionally well in August 2005, but had virtually no regrowth during September due to drought. It died out during the winter of 2005-06. Statistically, all of the other grasses performed equally in August. September saw mixed results, with tall fescue, orchardgrass, and festulolium providing more late summer forage than the newly introduced species of meadow bromegrass and meadow fescue. Palatability, as determined by the percent of the plot that was grazed, was not significantly different between species.

Results from the 2006 grazing season similarly showed that the experimental species did not produce more late summer forage than typical Wisconsin pasture grasses. Orchardgrass and festulolium provided the most forage during the two years of the trial. Festulolium's high productivity and palatability are offset by a lack of winter hardiness during an open winter without snow cover. Meadow fescue persisted through the 2006 grazing season and had good palatability, but produced the least amount of forage.

From this limited and drought-impacted trial, it appears that meadow fescue and meadow bromegrass do not perform better in late summer than commonly uses species such as tall fescue, orchardgrass, or reed canarygrass. Further studies are underway to find other varieties of grasses, in particular high quality ryegrasses, that will persist through the winter and yield well on managed grazing farms in the late summer season.

References, resources, links: For information about ongoing trials examining these and other types of grasses that have promise for providing late summer growth in grazed pastures, please see research updates on Dr. Undersander's website: www.uwex.edu/ces/forage. This site includes research results from other forage trials, seed sources, and seeding rate recommendations.

Lancaster Agricultural Research Station, Lancaster, Wisconsin 2004 Grazing Species Seeding

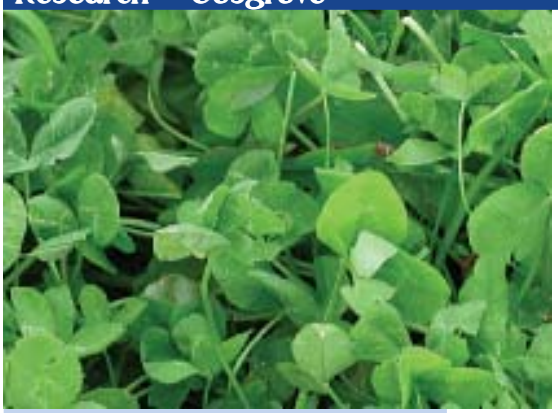
Specie	Regrowth^ ton/a 9/1/04	Regrowth ton/a 8/31/05	Regrowth ton/a 10/5/05	Palat.* 8/31/05	Palat. 10/5/05
Festulolium	0.59	0.56	0.34	2.8	3.3
Meadow brome	+	0.65	0.15	3.0	3.0
Meadow fescue	0.51	0.48	0.27	2.5	3.5
Orchardgrass	0.50	0.48	0.39	3.3	3.0
Quackgrass	+	0.51	0.27	2.3	3.0
Tall fescue	0.45	0.48	0.54	2.5	1.8
Mean	0.51	0.53	0.33	2.7	2.9
LSD(5%)	ns	0.09	0.09	ns	ns
CV%	17.0	11.7	17.2	22.4	32.2

^*regrowth based on pasture plate measurements.*

*PALAT.=Palatability rating 0=0% grazed, 1=20%, 2=40%, 3=60%, 4=80%, 5=100% grazed. Palatability of grasses under grazing is determined by visual estimation of percent defoliation of plots. The visual determination is made midway during grazing.

ns=values not significantly different from others in column

+ Due to annual grass infestation, seeding year stands not established enough to warrant plate measurements



Nitrogen management strategies for Wisconsin pastures

Summary: This project assessed the impact of applying chemical nitrogen (N) at different times and amounts to several types of pastures under managed grazing. While a traditional recommendation for pasture N application is three times over the summer months, this project found that one N application in either May or August significantly increased the yield (amount) of pasture growth. Multiple applications of N did further increase grass productivity at the cost of additional N fertilizer, labor and fuel for application, and a decrease in the amount of legume in the pastures. The application of nitrogen in August might be particularly useful to graziers who find that they have enough grass growth in May, whereas in late summer and early fall they could use additional forage for their livestock.

Highlights: Based on the results of this study, the most cost effective times to apply nitrogen to pasture are early May and early August. Applications of 50 units of nitrogen at either of these times gave the largest increases in dry matter of pasture per pound of nitrogen applied. Applying nitrogen in mid-June did not contribute greatly to grass growth, countering the conventional wisdom that mid-summer N application can help farmers get through the "summer slump" in cool season pastures.

Project leader and contact information: Dennis Cosgrove, Professor of Agronomy, UW-River Falls, 410 S. 3rd St., River Falls, WI 54022, 715-425-3345

Project location: The pasture plots are located at the UW-River Falls beef rotational grazing farm.

Primary audience and participants: Graziers who are trying to balance pasture productivity with costs, specifically with regard to whether, how often and when to apply chemical nitrogen fertilizer; grazing specialists, university, and agency staff who work with farmers.

Background: A standard recommendation for N fertilization of pastures used for managed grazing has been three applications of 50 units per acre of N, spread through the growing season (typically May 1, June 15 and Aug. 1). One reason is that applications in excess of about 50 units of N/acre are not used by the pastures for regrowth. Second, it was believed that the added N, especially in June, would help producers get through the "summer slump" in typical Wisconsin cool season grass growth. However, given the labor and expense required to apply N and the potential for reducing the desirable legumes in the pastures, producers are often uncertain when and how much N to apply to the pastures they harvest by livestock grazing.

Description of activities: This study tested N applications to three types of pastures. Each pasture had a different mixture of predominant grass and legume species. One contained mostly Kentucky bluegrass and white clover; the second was a smooth bromegrass and alfalfa pasture; and the third was composed of orchardgrass and red clover. The tests were conducted in 2004 and repeated on the same pastures in 2005.

There were five different protocols for urea nitrogen application used on the three pastures: 1) a single application of urea N at 50 units per acre on May 1; 2) a single application of urea N at 50

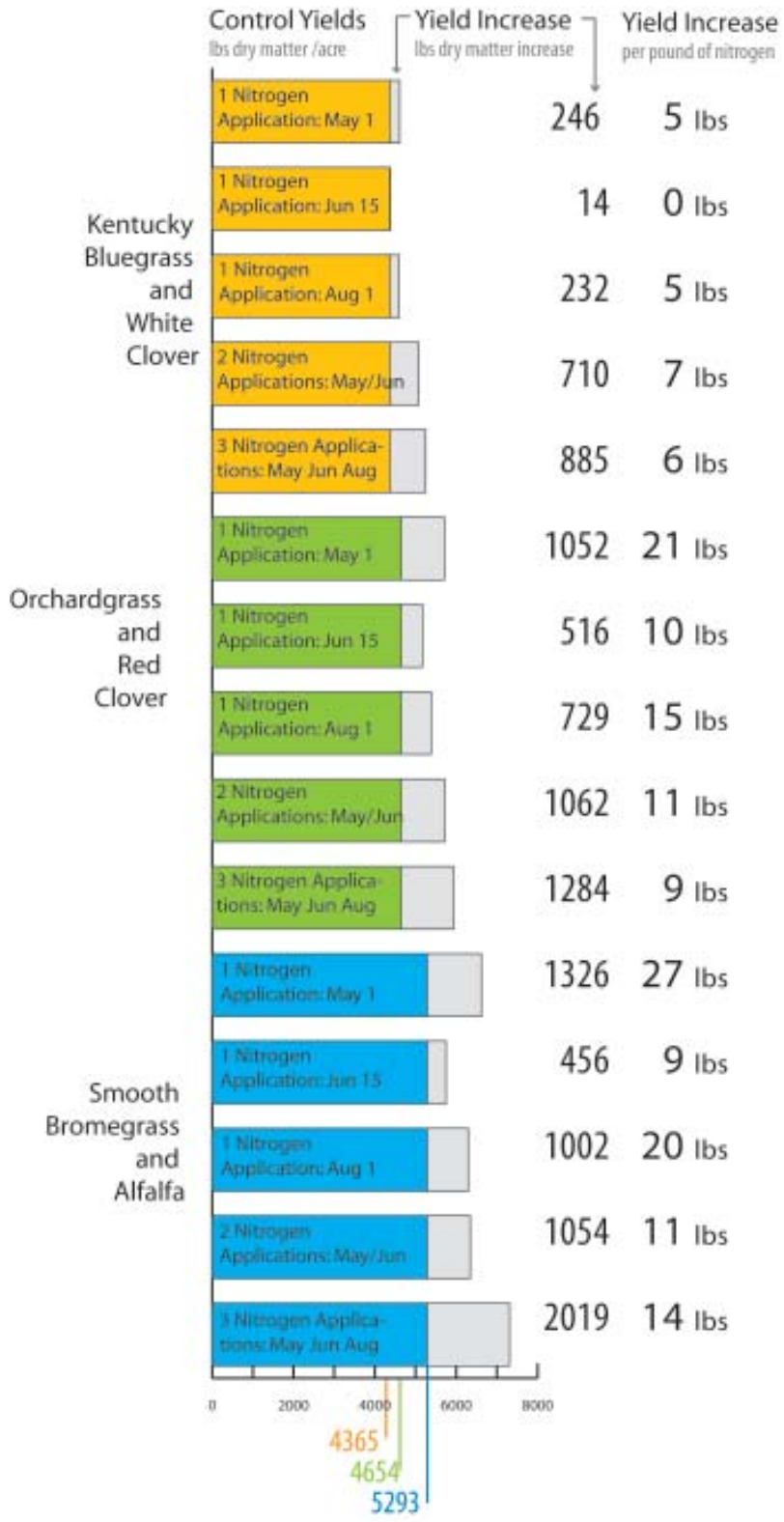
units per acre on June 15; 3) a single application of urea N at 50 units per acre on August 1; 4) two 50 unit per acre applications of urea N, on May 1 and June 15, for a total of 100 units/acre; and 5) three 50 unit per acre applications of urea N, on May 1, June 15 and August 1, for a total of 150 units/acre.

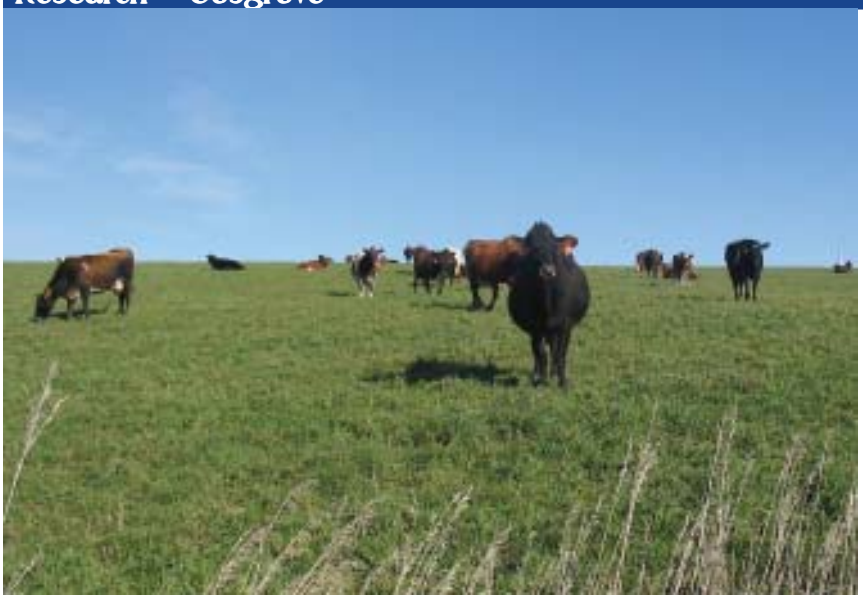
Pasture quantity was measured with a plate meter before and after beef cattle grazed the pastures. The results are expressed as pounds (lbs) of dry matter (DM) per acre. The yields from each grazing event were added for the total yield of the grazing season. Additional effects measured were sward density, tillering, and legume composition. The results from 2004 and 2005 were averaged.

Results: While using three nitrogen applications gave the highest total yields, applying N in June was the least effective at increasing grass growth. Single applications of N in either May or August gave significant increases in pasture DM. The smooth bromegrass and orchardgrass pastures were the most responsive to the added nitrogen.

Although applying nitrogen three times during the summer provided the largest total increase in pasture yield, it was not the most efficient. The response per pound of nitrogen applied was highest when N was applied only in May, followed by the use of added N just in August. The Kentucky bluegrass pasture

Yield increases from nitrogen application





responded very little to added N, likely due to the amount of white clover present in the pasture which may have already been providing enough nitrogen for the bluegrass.

The effect of nitrogen application on the legume composition of the pastures was a small reduction in the amount of legume in all pasture types. Most pastures showed approximately 2-10 percent reduction in legumes, with the multiple nitrogen applications resulting in larger reductions in legume content. The orchardgrass/red clover pastures were the most strongly affected; these pastures started with more than half legume and showed 10-20 percent decreases in the red clover as a result of the increased growth by the highly competitive orchardgrass. There was no observable difference in sward density or tillering in the spring on the pastures with applied nitrogen compared with the control pastures that did not receive added nitrogen.

The researcher noted that while he hopes the results will be a useful guide for farmers, this work was done at a single location in west central Wisconsin. The optimum nitrogen application rates and times may be somewhat different in other locations depending on the climate, species composition and growth rates of the pastures.

References, resources, links: *Nitrogen Management in Rotationally Grazed Pastures* fact sheet on Team Forage web site (see http://www.uwex.edu/ces/crops/uwforage/GN-Nitrogen.pdf). A spreadsheet is also available for the estimation of the potential return on nitrogen fertilization of pastures using various urea N costs: www.uwrf.edu/grazing and click on 'software.'

Does managed grazing protect groundwater by denitrification?

Summary: Nitrate in groundwater can cause health problems in infants and, at higher levels, poor performance in livestock. Denitrification is a chemical process in which nitrate is changed into harmless N_2 gas, a major component of the air we breathe. This project was designed to document the efficiency of denitrification under managed grazing compared to conventionally cropped ground. A preliminary trial showed that denitrification efficiency in soils and groundwater under managed pastures was greater than under cropped ground. Results from a more extensive experiment testing shallow groundwater at five managed grazing locations and four cropped ground sites confirmed that denitrification efficiency of groundwater under managed pastures was more efficient. The subsurface soil environment in managed pastures is likely richer in plant, microbe, and macrobiotic activities which varied over time and paddock locations. This complex soil environment may support helpful groundwater denitrification better than typically cropped and fertilized fields. The study suggests that managed pastures leach less nitrate into groundwater than do conventionally cropped fields and may be able to intercept and denitrify nitrate from nearby, sloped, or ridged environments. In this way, managed pastures could contribute to bioremediation prior to the point of groundwater discharge.

Background: The problem of nitrate contamination of groundwater beneath coarse, medium, and sandy soils is a public health and agricultural concern. Across Wisconsin, about one in ten wells test high for nitrate. In some highly agricultural areas of the state, more than 60% of wells are contaminated with more than 10 mg/liter (ppm) nitrate. At this level, nitrate in water can cause illness in infants and, at higher concentrations, poor performance in livestock.

Can managed grazing help control the amount of nitrate reaching our groundwater? To answer this question, this project measured denitrification efficiency in pastures under managed grazing and cropped land. Denitrification efficiency is the percent of nitrate transformed to harmless N_2 gas. The air we breathe contains 78% N_2 gas.

Highlights: Overall, compared with groundwater under cropped ground, managed pastures:

- Leached relatively little nitrate to groundwater,
- Had lower amounts of the global warming gas N_2O in groundwater, and
- Showed similar groundwater phosphorus levels.

Project leaders: Bryant Browne, Professor of Soil and Water Resources, UW-Stevens Point, 715-346-4190, bbrowne-@uwsp.edu; and Nancy Turyk, Water Quality Specialist/Hydrologist, UW-Stevens Point, 715-346-4155, nturyk@uwsp.edu both at 1900 Franklin St., Stevens Point, WI 54481

Project locations: Nine farms in central Wisconsin: four managed grazing farms each paired with four nearby conventionally cropped farms, plus an additional managed grazing farm. See map.

Primary audience and participants: Farmers, farm advisors, agency personnel, lending institutions, water resource managers, and researchers.

Prior to this study, information was not available to directly compare groundwater denitrification activity under managed grazing systems and cropped systems. Generally speaking, cropped fields require repeated high levels of N fertilizer application, whereas managed grazing systems often incorporate legumes into pastures and use less, or no, chemical nitrogen fertilizer. In addition, permanent sods created by the grass/legume stands have diverse plant, microbe, animal, and soil interactions which provide a different, more complex subsurface environment than the soil under monoculture row crops. This rich near water table environment found between the soil surface and shallow groundwater under pastures may encourage denitrification.

Description of activities: This project started as a preliminary trial in 2002 and 2003 in soil and groundwater at two locations in Wisconsin. It was expanded to five managed grazing locations and four cropped sites in 2004 and 2005 with an emphasis on groundwater evaluation. Each cropped farm was paired with a managed grazing farm in close proximity. An additional managed grazing farm volunteered for this study; it was not paired with a cropped farm.

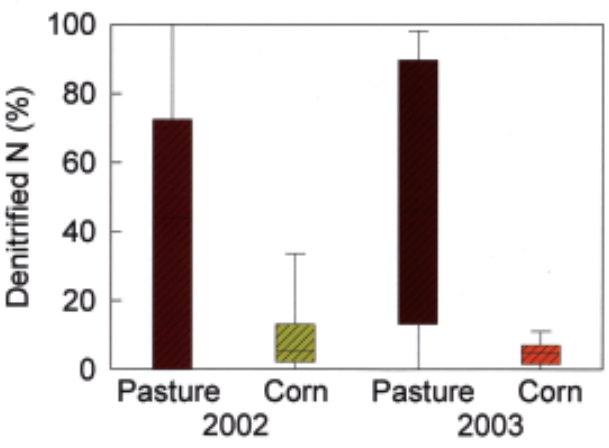
The researchers chose sites with relatively sandy soils and a short distance to groundwater. Overall, coarse soil type was the main selection criterion. The participating farms volunteered for the study and met these conditions as well as possible; the project staff did not look for or use "worst case scenario" cropped fields.

Water samples were collected in order to quantify denitrification in groundwater associated with the near water table environment. A sampling grid was used for water collection across each field or paddock. Approximately 30 miniature wells were set up per sampling grid and each grid was sampled once a summer for the two years of the project. Groundwater samples were analyzed for dissolved solutes (major ions, Fe, Mn, pH and specific conductance) dissolved nutrients (various forms of nitrogen, phosphorus and carbon), and dissolved gases (N_2, Ar, N_2O, H_2, CH_4, O_2, and CO_2).

Water table mapping, hydraulic conductivity testing, and temperature measurements were performed on each farm. Calculations of denitrification efficiency and other data analysis will be detailed in a journal publication.

Results: The near water table environment under managed grazing was found to be biologically and chemically diverse, with a large capacity for processing matter and energy. In contrast, cropped ground was found to be more subdued in its denitrification efficiency. In 2002-03, denitrification efficiency was shown to be greater under pasture than under a corn crop, with 70-90% of nitrogen denitrified under pasture compared to 10-15% under corn. In the expanded groundwater study in 2004-05, measurements of denitrification efficiency yielded similar results. As a result, relatively little nitrate reached groundwater on the managed grazing farms and a higher percent of leached nitrate was converted to N_2 gas. Furthermore, lower amounts of

Denitrification efficiency



the global warming gas N_2O were detected in managed grazing systems than in cropped systems.

The researchers also measured phosphorous (P) in groundwater. While there has been speculation that P levels are higher in groundwater below pastures, this was not the case here. P levels under the managed grazing pastures were similar to those under cropped fields across three-fourths of the sampled locations. In addition, the top P concentrations (highest 25% of sampled locations) were notably higher under cropped fields than under managed grazing pastures.

In the pastures, anaerobic activity in the near water table environment converted a higher percentage of groundwater nitrate into harmless N_2 gas. Patchy aerobic and anaerobic activity was observed in the paddocks in 2004 and 2005. This dynamic patchiness is likely due to the multiplication of soil organisms in response to animal events such as dung and urine deposition, as well as temperature, time, and moisture changes. It appears to create greater denitrification efficiency in managed grazing than in conventionally cropped systems.

A potential practical outcome of the project is to help farmers and others understand and evaluate strategies for application of N fertilizer to pastures in order to improve forage quality and production while maintaining groundwater quality. This work could also contribute to the effective design of nutrient management plans with respect to nitrogen. The near water table environment of pasture systems may be able to provide bioremediation by intercepting a portion of nitrate leached to shallow groundwater from adjacent cropped systems.

References, resources, links: Bundy, Larry G., Lynda Knobeloch, Bruce Webendorfer, Gary W. Jackson and Byron H. Shaw. *Nitrate in Wisconsin Groundwater: Sources and Concerns*. Cooperative Extension Publication G3054, University of Wisconsin-Extension, 30 N. Murray St., Madison, WI 53715.

Nutrient Management Subcommittee of the Nonpoint Source Pollution Abatement Program Redesign. *Nitrate in Groundwater – A Continuing Issue for Wisconsin Citizens*. March, 1999; revised 2006.

Surface water quality impacts of managed grazing

Summary: This ongoing project is testing nutrient runoff in water from outwintering paddocks on two different grazing dairy farms. These measurements will help determine the nutrient loads being added to the watershed and may be used to develop appropriate management practices. Results indicate that growing pastures are capable of reducing nutrient runoff, but that early spring rain events prior to the growing season may cause problems. Specifically, runoff from bare or frozen pasture and outwintering sites with substantial manure deposits might be problematic. To reduce nutrient runoff, graziers may want to consider manure removal or other mediating actions on frozen pastures, fields without tall or dense stands of residual grasses, and areas that are sloped.

Highlights: Results from this research show the importance to farmers, grazing specialists, and conservation personnel of being aware of factors such as pasture density, slope, soil type and porosity, animal stock rate, and time in pastures with respect to water quality and potential runoff.

Project leaders and contact information: Anita Thompson, Professor of Biological Systems Engineering, Rm 115 Ag Engineering Bldg, UW-Madison, Madison, WI 53706, 608-262-0604, amthompson2@wisc.edu; and Fred Madison, Professor of Soil Science, 1525 Observatory Drive, UW-Madison, Madison, WI 53706, 608-263-4004

Project locations: Two grazing dairy farms; one on sandy soils in central Wisconsin and the other on red clay soils in eastern Wisconsin.

Primary audience and participants: Graziers and farmers who have livestock on pasture during the winter. Farmers and agency personnel who assist in the writing of nutrient management plans and the development of nutrient management standards.

Background: Wisconsin farmers are required to develop nutrient management plans in order to assess and maintain appropriate levels of the essential, but sometimes oversupplied, nutrients necessary for plant growth and productivity. These standards focus particularly on phosphorus (P) and nitrogen (N), two of the most common nutrients applied either chemically or in animal manures. In order to prevent buildup in the soil or leaching and runoff of these nutrients to surface and groundwater, farmers and agricultural specialists need accurate data for different soil types, crops, slopes, and fertilizer application practices. A great deal of this information related to row crops has been collected. However, there has not been data to show whether managed grazing farms, particularly dairy farms with relatively large numbers of cows, have impacted nearby surface water quality.

In general, the mixed grass and legume pastures maintained by graziers are thought to be environmentally sound. These pastures tend to build organic matter, reduce soil compaction, provide wildlife habitat, prevent erosion, and use less fuel and fertilizer. During the summer months, when cattle are rotated frequently and the pastures are actively growing and utilizing nutrients, there may not be much reason for concern on well-managed farms. (See also the Browne project on denitrification activity in groundwater on page 27). However, in winter cattle are sometimes fed and kept

on a limited area of pasture that provides natural wind protection, or that the farmer thinks could use nutrients from manure, bedding, and hay residue. This practice is called 'outwintering.' During the spring thaw and rain events, nutrients such as P and N may be washed off of outwintered pastures and enter the regional watershed. This ongoing project tests runoff waters from the outwintering paddocks of two grazing dairy farms. Results will help determine the nutrient loads being added to the watershed and develop appropriate management practices.

Description of activities: Monitoring equipment was set up to study the surface runoff from the outwintering areas on each of the farms. A flume, automatic water sampler (ISCO), and rain gauge were installed at the outlet of the outwintering drainage area on the central Wisconsin farm site (see photo above). A culvert, area-velocity meter, and automatic water sampler (ISCO) were installed on the eastern Wisconsin farm site (see photo at left).

Flow rate and water quality samples were collected for the spring snowmelts and runoff events of 2005 and 2006 on the central Wisconsin farm and for 2006 on the eastern Wisconsin farm. Water samples were analyzed for nutrients and solids. The snowmelt measurements were complicated by equipment freezing problems and did not yield accurate flow data in 2005. The problems were corrected for future sampling. Soil and vegetation sampling was conducted within paddocks in the outwintering drainage areas on both farms at several times between October, 2005 and September, 2006. Leaf area index and forage yield were estimated and soil samples were analyzed for nutrients.

Results: In 2005, although the total rain and snowmelt rates were not collected, water samples from the central Wisconsin farm were analyzed for sediment and several forms of phosphorus. The amounts (concentrations) of sediment and phosphorus were plotted by individual samples, taken in chronological order during spring snowmelt and rain events (Fig. 1).

Relatively low levels of sediment and P were observed during snowmelt until the first rain storm, shown by samples 60 to 70. Vegetative cover was thin during this time prior to pasture growth,

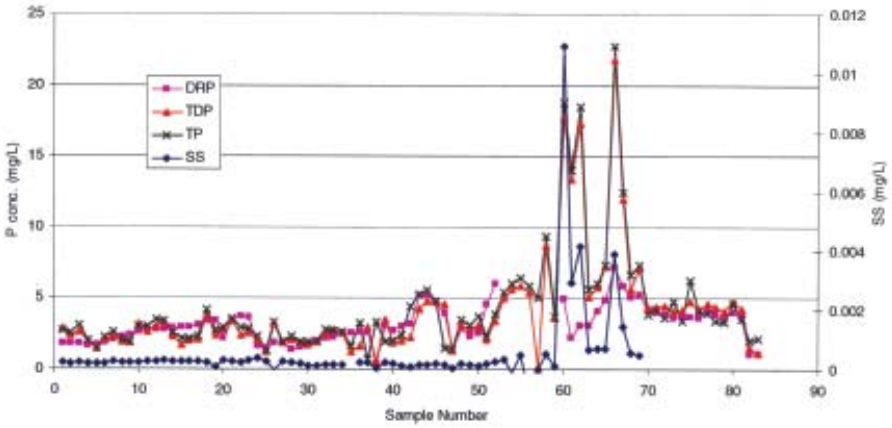


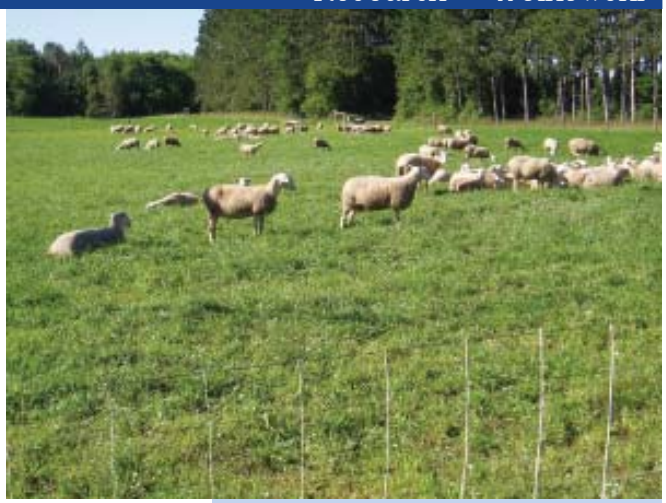
Figure 1. Sediment (SS), Dissolved Reactive Phosphorus (DRP), Total Dissolved Phosphorus (TDP) and Total Phosphorus (TP) for the 2005 snowmelt period on the central WI farm.

leaving the ground vulnerable to erosion and nutrient runoff. Samples 70 and above were collected after pastures had started growing, and the P levels were correspondingly lower. In addition, the sandy soils on this farm did not produce much runoff from rainfall once the ground had thawed.

In 2006, water runoff samples were collected from both farms throughout the snowmelt and rainfall events of the spring and summer. Overall, the eastern Wisconsin farm had more rainfall events and much greater runoff. The heavier red clay soils on this farm were slower to absorb large quantities of precipitation and prone to water movement across the soil surface. When the water samples from these runoff events were analyzed, the amounts of sediment and P were correspondingly higher at the times that more runoff was collected. In particular, P was high in runoff from the eastern Wisconsin overwintering site, due to the larger number of cattle that had been stocked there as well as the clay soil.

Monitoring and measurements will continue in 2007. Sediment and phosphorus loads seen in surface water runoff are affected by a complex combination of factors, including soil type and porosity (including freezing and thawing), pasture density, animal numbers and time spent in the overwintering site, as well as the particular snowmelt and rain events. Therefore, it is hard to generalize these results to other situations. Nonetheless, this research is the first step in developing a database of measurements from working farms, from which appropriate management strategies can be developed.

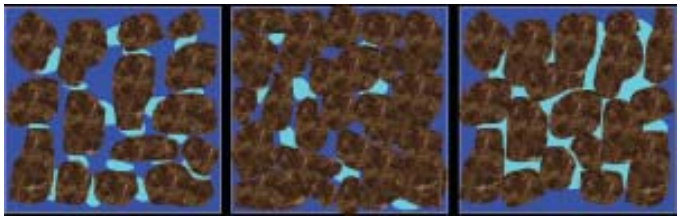
Identifying and managing soil compaction in managed pastures



Summary: This project sought to determine the extent of soil compaction in pastures that were using managed grazing and consider possible remediation strategies. It was found that the type and severity of compaction varied strongly by soil type, vegetation, weather, the location of feeding and watering units, and animal stocking density. In general, high animal traffic was associated with greater compaction, as were rain events and defoliation (bare spots). Some problems were similar to those observed on cropland; however, the compaction effect on pastureland was shallower. Well-maintained pastures were not prone to increased compaction when grazing rotations were correctly managed.

Background: Is soil compaction from animal traffic in grazed pastures a problem? Soil compaction is defined as the compression of the soil from an applied force that first rearranges and then destroys soil aggregates, increases bulk density, and reduces porosity. Compaction happens over time as soil particles group together more tightly and create firmer ground. It becomes difficult for plant roots to penetrate through the compressed soil, causing significant stunting of growth and drought stress.

Compaction by vehicle traffic in row crops is known to significantly limit grain yields, with typical yield reductions of 10-50%. Soil compaction also affects forage quality and productivity, and may contribute to increased runoff and transport of nutrients to surface water. Farmers and county agents have wondered whether compaction and erosion are risks for a typical grazing dairy farm.



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Compaction is a process

Highlights:

Remediation of compacted soils can be difficult, expensive, and not always successful. This study found that well-managed pastures were not prone to compaction. Graziers can avoid compaction by:

- Minimizing animal traffic and stocking time on wet soils
- Evaluating and monitoring pasture quality
- Testing soil to assure adequate fertility
- Preventing overgrazing
- Limiting heavy vehicle traffic
- Addressing compaction issues when they occur

Project leader and contact information: Richard Wolkowski, Extension Soil Scientist, Professor of Soil Science, UW-Madison, Madison, WI 53706, 608-263-3913, rpwolkow@wisc.edu

Project location: Five grazing farms across Wisconsin.

Primary audience and participants: Graziers, co. agents, agency staff, and crop advisors.

Livestock graze at different times of the year, during varied weather conditions, and at different animal densities. They sometimes graze on wet ground, which is the most vulnerable to compaction. Also, even long-established pastures may have a "plow layer" of compacted soil six to eight inches below the surface due to years of moldboard plowing prior to being converted to pasture. While effects of deeper compaction may not always be visible, drought stress and yield reductions could occur.

Because remediation of compaction by subsoiling (deep tillage) is expensive and natural methods such as freezing and thawing often take many years, farmers and agricultural agents have sought to minimize compaction. It has not yet been determined how much compaction is caused by managed livestock grazing systems.

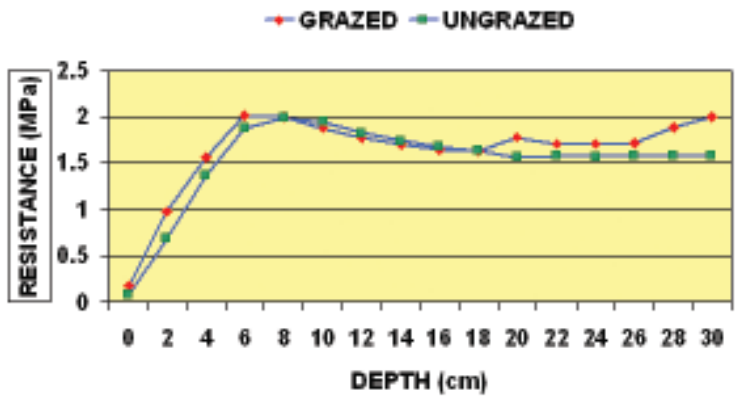
Description of activities: Five farms were selected that were using managed grazing. A GPS was used to grid sample about 20 points in each pasture area. Soil was sampled at depths of 0-1 inch and a 1-6 inch layer. Measurements taken included penetration resistance, soil bulk density, porosity, and routine soil tests for potassium, phosphorus, organic matter, and pH. The researchers used a probe on a wheeled cart (constant-rate cone penetrometer) to test penetration resistance as one determinant of compaction. Soil cores of a known diameter were taken, oven-dried, and weighed to determine soil bulk density.

Results: The vastly different soils and topography at each farm showed varying amounts of compaction. It was hard to compare results between farms because there is no absolute number for penetration resistance or bulk density that is 'good' or 'bad.' The results depend on soil moisture and texture, and the conditions of a particular field at the time of testing. Therefore, it was not possible to average the results across all farms.

The example shown in the graph below is from a pasture in Dane county, half that was ungrazed and half that was grazed for six hours by a herd of 80 Holstein cows the day before testing. Comparing the ungrazed and grazed areas of the paddock, it was found that there was slightly greater penetration resistance at ten of the fifteen depth levels in the grazed area. It was suspected that the increased resistance in the surface at 8 cm (3-4 in) was due to grazing. The differences below 20 cm (8 in.) were assumed to be caused by variations in the subsoil, because the measured areas were not established in a randomized design.

Comparing the penetrometer resistance at two specific depths (4 cm and 8 cm) throughout the two pastures, the ungrazed pasture had spots that showed both more and less resistance (compaction) than tests taken throughout the grazed pasture. Thus, it was hard to generalize, even within one

Penetrometer resistance following six hours of grazing by 80 Holstein cows



farm or pasture, about the effects the dairy herd had on soil compaction after one grazing event.

Another risk with overgrazing pastures (see photo at right) is that exposure of extensive bare spots on a compacted soil could increase erosion potential and the movement of phosphorus to surface water. Soil test data showed higher levels of soil test P in the surface at one inch compared to six inches.

In general, good grazing management leaves enough plant material or residue to minimize bare spots, and the grass recovers and grows quickly enough to provide another round of grazing in a few weeks. However, the possibility of compaction and erosion in pasture systems reminds farmers and farm advisors to watch for such problems and try to prevent them by reducing stocking time and/or animal numbers.

Remediation of compaction is often difficult, expensive, and not always successful, so the primary recommendation is to avoid or minimize compaction. The best way to prevent compaction is to limit vehicle or animal traffic on wet soils. However, the following strategies can address compaction when it is found:

- compaction can be removed by tilling deeper than the compacted layer using the proper implement on dry soils
- adding organic matter such as manure and compost can reduce compaction
- planting deep-rooted crops such as alfalfa can address compaction with time
- the freezing and thawing action of winter and spring can sometimes break up shallow compaction
- planting cover crops or grass/legume pastures can improve the soil structure, reduce surface crusting, and allow better moisture and air penetration for improved plant growth. This can reduce compaction and its effects.

Does this level of grazing present an erosion risk?

References, resources, links: "Preventing and Lessening Compaction," from *Building Soils for Better Crops*, 2nd Edition, Sustainable Agriculture Research and Education publication, www.sare.org/publications

Soil Compaction: Problems and Solutions, Cooperative Extension Service publication AF-115, Kansas State University, Manhattan, Kansas. 1996, revised 2004.

Soil and root variables in outwintered and fallowed paddocks

Summary: The primary goal of this project was to assess the effectiveness of outwintering followed by an extended rest period—called fallowing—in order to reduce winter labor and expenses while improving soil fertility and grass root growth. Under this system of pasture improvement, cows are fed on a weak pasture during the winter months. Nutrients from the remaining manure and hay residue are taken up by the plants during a subsequent fallow period, which should improve grass productivity by encouraging root growth. On each of the three participating farms in 2003-04, one paddock was outwintered and then fallowed during the grazing season. A second "check" paddock with similar soil conditions was grazed. The results varied by farm, but the fallow paddocks generally showed improvement based on several factors like root health, organic matter, and productivity (yield). The weakest pastures improved the most in terms of productivity, while the farm with the healthiest roots prior to fallowing responded less.

Highlights:

- Plants in outwintered and rested paddocks appeared to have healthier roots than grazed check paddocks.
- Paddocks with low root mass in 2004 on two farms responded more to outwintering and rest compared to paddocks having higher root mass on one farm.
- Outwintering and rest increased weed root growth, especially quackgrass in the paddock with the weakest cultivated grass stand.

Project leaders and contact information: Carl Fredericks, Grass Mapping Enterprises. LLC, 10246 Gilbertson Rd, Mount Horeb, WI 53572, 608-437-4395, rehlfred@mhtc.net; and Dr. Walter Goldstein, Director of Crop Research, Michael Fields Agricultural Institute, PO Box 990, East Troy, WI 53120, 262-642-3303, wgoldstein@michaelfieldsaginst.org

Project locations: Three managed grazing dairy farms in Green, Lafayette and Dane counties.

Primary audience and participants: Upper Midwest dairy graziers, particularly those with sparse pastures on ridges, high ground, or otherwise in need of improvement.

Background: "The Driftless Region of southwestern Wisconsin has been cropped since the mid-1800s with a gradual decline in soil depth, organic matter, tilth, and water holding capacity," according to Carl Fredericks, project leader. While permanent sods such as pastures or CRP ground have higher organic matter content and water retention than cropped ground, even managed pastures are subject to drought and nutrient stress depending on weather, livestock, harvesting practices, and other factors.

The farmer participants in this study wanted to experiment with a pasture improvement practice used in southeastern Minnesota. These graziers identified pastures that were less productive, in poor overall condition, and suitable for outwintering cattle. Cows were outwintered on these pastures to improve soil conditions with nutrients from manure and hay residue. Next, the pastures were fallowed for a season so that the forage plants could respond to the nutrients: plants could grow and develop stronger, healthier and deeper root structures and improve their quality and productivity for future years of managed grazing.

Description of activities: Data was collected between 2003 and 2005 in two paddocks on each farm: one fallow paddock and an adjacent "check" paddock with similar soil and slope. The fallow paddocks were outwintered during the winter of 2003-04 and rested until July 2004, when the grass was cut. These paddocks were rested again until the late summer and early fall, when they were grazed. The check paddocks were not outwintered and were part of the usual cattle rotation the during the 2004 grazing season. In 2005, both the fallow and check paddocks were grazed.

In October of all three years, soil was sampled and tested for phosphorus, potassium, pH, and organic matter. Pasture composition was visually estimated. In 2004, five grass samples per check paddock were clipped and weighed before each grazing to measure available dry matter. Hay yield was estimated in the rested paddocks, and available dry matter was measured in these paddocks before grazing in the late summer and fall. In 2005, available dry matter was measured in both paddocks before each grazing. Plant roots were sampled in all paddocks in June 2004 and early July 2005, and tested for health and productivity.

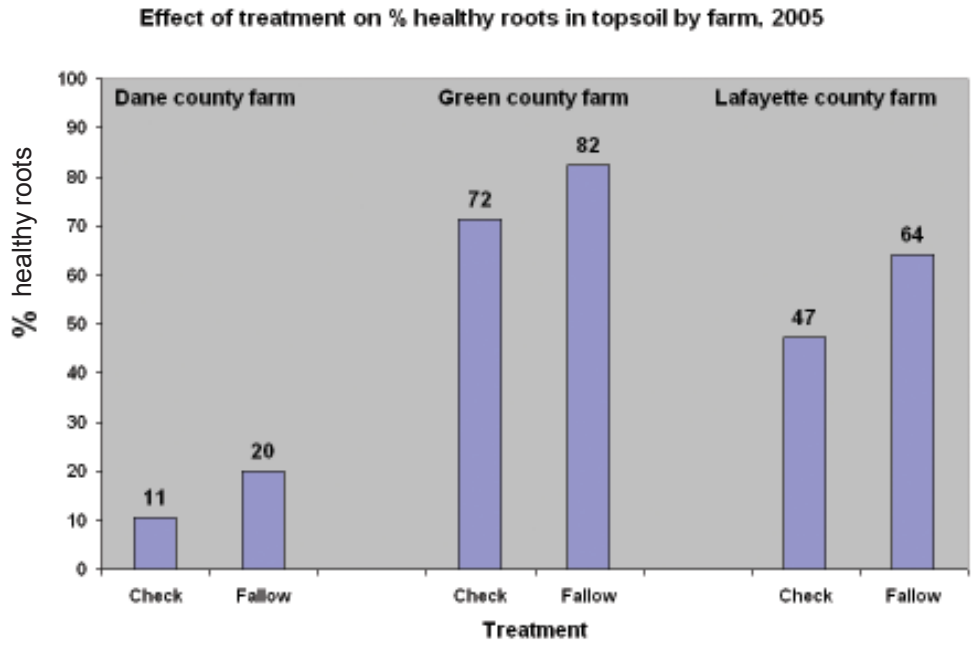
Farmers monitored and documented the outwintering activity on the experimental paddocks during the winter of 2003-04, including cow numbers, the amount of hay fed and how it was distributed, and the time the cattle spent in the paddocks. These management decisions were made by the farmers.

Results: The sward composition in outwintered and fallowed paddocks was similar to that of the check paddocks. Visually, the amount of clover in the fallowed paddocks did not appear to increase. One farmer clipped and mulched the fallowed paddock late in the summer while the others made hay. These differences, as well as dry weather conditions in 2005, made it hard to assess the impact of fallowing on legume growth and distribution.

In terms of yields, available dry matter (in lbs/acre) stayed the same or increased on the outwintered and fallowed paddocks. Yields on the Lafayette County farm did not increase substantially, probably because the pastures had the most roots and the healthiest roots in 2004. The other two farms showed large increases in yield, suggesting that they were better able to respond to the outwintering and rest. Root production in these pastures was measured in detail. Overall, plants in the outwintered and fallowed paddocks had healthier roots than plants in the check paddocks.

2005 Outwinter/Fallow Yields compared to 2004 and 2005 Check Yields

Farm location	2005 Outwinter/Fallow	2005 Check	2004 Check
Green county	13,655 lb/acre	6855 lb/acre	9492 lb/acre
Dane county	11,259 lb/acre	6234 lb/acre	9309 lb/acre
Lafayette county	9951 lb/acre	9614 lb/acre	9664 lb/acre



In 2004, the plants in the paddocks on two of the farms had fewer, weaker roots than the those found on the third farm. The paddocks with fewer roots responded more to outwintering and fallowing. Weed root growth increased in response to outwintering and rest, especially quackgrass in the paddock with the weakest cultivated grass stand.

References, resources, links: A full report detailing project results is available on the Michael Fields Agricultural Institute web site: http://www.michaelfieldsaginst.org/programs/crops/outwintering.html