

“USDA NRCS Technology News” ~ May 2001

United States Department of Agriculture
Natural Resources Conservation Service
Science and Technology

“USDA NRCS *Technology News*” is a monthly electronic information piece provided by Science and Technology. It is designed to deliver pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas. “USDA NRCS *Technology News*” is in a format that is available to all NRCS field staff.

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MESSAGE FROM THE DEPUTY CHIEFS

Lawrence E. Clark and Maurice J. Mausbach

For generations, farmers have managed animal waste by spreading it on cropland, where it served the dual purposes of manure management and crop fertilization. With the

advent of relatively inexpensive chemical fertilizers and increasingly larger and concentrated livestock operations, this process is no longer feasible. We have too much animal waste in specific locations and not enough land on which to distribute it at appropriate agronomic rates. In recent years, we have also learned much more about the impacts of animal waste on the environment. With sophisticated new technologies, we now are able to track the movement of nutrients, such as nitrates and phosphorus, and to document their impact on ground and surface water. We are also able to understand the impacts of animal waste on air quality. This increased recognition of the detrimental impacts of large amounts of manure on soil, water, and air has led to greater emphasis on manure management in conservation planning as well as regulatory approaches, such as the Environmental Protection Agency's Confined Animal Feeding regulation.

Today, more and more pressure is on farmers to practice good animal waste management on their farms. Yet, although we know something about what farmers do to respond to these pressures, we know very little about why and how they decide what to do about it. Understanding the "why" and "how" can provide helpful information to conservation planners who work with farmers to find solutions to their animal waste problems. An Iowa State University team addressed the issue in a recent study to identify factors that farmers consider when they make manure management decisions. Researcher Tom Richard, an agricultural engineer, pointed out that: "Technical specialists sometimes see farmers doing the 'wrong thing,' and fail to appreciate the larger, sometimes complicated context of the decisions and practices." (1) When a conservation planner is unable to convince a farmer to install a specific system, it may be that the solution is technically sound, but inappropriate in the context of the farmer's decision system--a mix of economic, social, environmental, and cultural considerations.

One of the most interesting results of the study conducted by Richard and his colleague, sociologist Clare Hinrichs, is that most of the farmers in the survey used more than one type of manure handling and storage system. While some farmers had strictly solid systems and others had liquid-only systems, nearly half of the farmers had a combination of liquid and solid systems. The researchers pointed out that many policy approaches categorize farms on the basis of only one system. They also cautioned against the design of educational and technical assistance solutions that assume the use of only one system on an individual farm. Categorizing a farm on the basis of one system can limit the options a farmer might be able to consider in designing an appropriate management system, or even in the kind of financial and technical assistance that might be made available.

Another important finding from the research is that the farmer's manure management decision is actually a farm system decision, made in an environment of many factors. According to the researchers, "Things that can affect manure management decisions include historical precedents on the farm, individual and family preferences and values, economic constraints, environmental concern, neighbor relations, integrator policies, and a changing state regulatory climate." (2) Again, it is easy to see that policy and technical

approaches might fail to recognize the complexity of the decision system utilized by the farmer to identify the approaches necessary to manage manure on the farm. Comprehensive conservation planning can help farmers incorporate individual concerns into an all-inclusive decision that results in an animal waste system tailored to the specific farm operation.

According to the study, farmers need solutions that satisfy both the goals of environmental protection and economic feasibility. Although most farmers agree on the importance of protecting water quality, cost can be a prohibiting factor. However, Richard writes, "the ideal management systems must fit both the farm's unique physical characteristics and the farmer's unique personal preferences and motivations. In many respects, the environmental or economic performance of a technology may be less important than the comfort and satisfaction the farmer feels with it." (3) The research results highlight the importance of technical assistance in explaining appropriate technologies to the farmer and in helping to identify those methods that most closely meet his or her needs--whether the needs are economic, environmental, social, or a some combination.

This study contains some important insights for Natural Resources Conservation Service employees who work with farmers in the field, as well as for those at the national level who develop policy and implementation strategies for manure management. Program and policy managers need to avoid the "one size fits all" approach. Scientists and technical specialists who are focused on developing appropriate technologies cannot lose sight of the fact that these technologies must also meet the planning needs of the farmer. Conservation planners need to recommend technical solutions that are consistent with the farmer's decision system. The research confirms that no matter how well designed or effective the technology is proven to be, it will only achieve the goals of resource protection if it is adopted and utilized by the landowner.

Although these approaches may be more complex and lengthy for the technical specialist and the conservation planner, it seems apparent that a successful manure management program will seek to provide a number of options to the farmer. It should avoid the "one size fits all" approach and attempt to meet the farmers needs. As Clare Hinrichs concludes, "One size fits all' solutions provide an attractive, seemingly rational approach for regulators, but are contrary to the realities of livestock production and manure management systems." (4)

1. Adams, Mary, "Survey Looks at How Farmers Make Decisions about Manure Management", Leopold Letter, Vol. 13, No. 1 (Spring 2001)
 2. Ibid.
 3. Ibid.
 4. Ibid.
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CONSERVATIONIST'S CORNER

Steve Chick, State Conservationist, Nebraska

Our customers are becoming smarter and so must we in the Natural Resources Conservation Service (NRCS). The demands for technical assistance are becoming greater while our staff members are becoming fewer in number. The NRCS Science and Technology Consortium can, and does, help us keep abreast of technology in serving our customers.

Like many states, I suspect, the working relationship between the Centers and Institutes on the one hand, and the state and field offices on the other, has varied with the need. We have had extensive exchange with some, and there is room for more exchange with others.

With 23 million acres of grasslands in Nebraska, our exchange with the Grazing Lands Technology Institute has been extensive. All but one of this Institute's staff have been called into Nebraska. As a unit, they have helped with forage suitability group and ecological site descriptions, both in reviewing Nebraska work and coordinating across state lines. Assistance with rangeland health in training sessions on plant functional groups, hydrology, prescribed burning, and other topic areas, and involving the Soil Quality Institute, when needed, have been beneficial. Nebraska also participated in the Institute's Forage Quality and Livestock Well Being Project and uses the Grazing Lands Application software.

Being in the same town as one of the two National Soil Mechanics Centers (NSMC) is a benefit. We recently completed a construction inspection course for Nebraska engineers and engineering technicians at the Center facilities in Lincoln. The NSMC staff was helpful in the workshop preparation and gave the group a tour of the laboratory facilities. Course instructors used NSMC laboratory equipment to give the students hands-on experience in soil compaction inspection. The NSMC staff took part recently in an Agricultural Waste Facility Liner Design workshop for university staff, private consultants, and NRCS engineers.

The National Water and Climate Center (NWCC) is another excellent resource for technical material. Current versions of software for dam design, agricultural waste systems, and irrigation designs are available for review or to download from the NWCC web site. This Center and the National Water Management Center (NWMC) are key contacts for irrigation assistance for Nebraska's eight million irrigated acres. Both Centers help with technical exchange, water monitoring information, computer and on-site training, and more.

Many exchanges have, are, and will take place between Nebraska staff and our Centers and Institutes. For example, the Northern Plains Region is providing the Social Sciences Institute's "Developing Your Skills to INVOLVE COMMUNITIES in Implementing Locally Led Conservation" to our Resource Conservation and Development areas. One of our soil scientists will work with the National Soil Survey Laboratory and Soil Survey Center (SSC) as they work in a Nebraska County to develop

a phosphorus test for soil. The Watershed Science Institute and NWMC reviewed our Platte River Depletion Report, and this list could go on.

Nebraska is also working with the SSC and others on an on-farm carbon sequestration pilot project. Funded by the Nebraska Environmental Trust Fund, this project will examine soil carbon trends under various management options.

The Wildlife Habitat Management Institute has helped us provide field office and partner training on wetland restoration in river floodplains, and on basic fish and wildlife habitat management. Additional assistance is currently sought to help design stream gradient stabilization and wetland restoration projects that allow upstream movement of native fish species, some of which are on the state list of threatened and endangered species.

I am sure there is work I have left out, but it is not intentional. My point is, it is a must for those of us in the state and field level to involve and work with our Centers and Institutes. They bring additional perspective and knowledge to our local efforts. Technology sharing is a must.

NEW PRODUCTS AND SERVICES

DRAINMOD Reference Report Added to Wetland Science Institute Web Site

The DRAINMOD Reference Report is the latest addition to the Wetland Science Institute (WSI) web site. DRAINMOD is a software program that evaluates performance of drainage systems. It is a useful tool for field support staff to address wetland hydrology issues in the context of making wetlands determinations. This report, no longer available in hard copy, provides the developmental background information for DRAINMOD, including all developmental methodologies and procedures. This reference report is valuable for those using drainage equations, such as the ellipse equation, when evaluating the scope and effect of drainage systems. It is presented as scanned page images in pdf format. The web site address is: <http://130.74.184.149/Rodrigue/oxhomeformat.html>.

Additional information at the WSI web site, which is supported in part by the Agricultural Research Service, National Sedimentation Laboratory, in Oxford, Mississippi, includes: scope and effect equations (hydrology tools), PowerPoint presentations from the Hydrology Tools Course, constructed wetlands for agricultural non-point source treatment, wetland restoration information, and fact sheets and papers. For more information, contact:

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Health Concerns Associated with Blue-Green Algae

The Watershed Science Institute is preparing a technical note, in the form of an information sheet, on the potential health issues associated with blue-green algae blooms in impoundments, ponds, and lakes. Information on what blue-green algae are, why they are of concern, and how to recognize blue-green algae compared to other non-harmful algae are part of this technical note. What measures can be taken to limit blue-green algae blooms and limit exposure to algal toxins are also described.

Cyanobacteria, also known as blue-green algae, are the most primitive group of algae. Although they are most closely related to other bacteria, they have the same pigment for photosynthesis that plants have. Hundreds of kinds of blue-green algae are known from aquatic habitats, and a handful of these are of concern because of the toxins they produce. Nutrient enrichment often increases the amount of blue-green algae and may also enhance the dominance of noxious forms. Throughout the United States, ingestion by animals of water contaminated by noxious varieties of blue-green algae and the toxins they produce has resulted in poisoning, and sometimes death, of the animals. Animals affected include cattle, horses, sheep, hogs, ducks, dogs, and wildlife. Exposure and toxicity to humans has only recently been documented, and concern at water treatment facilities has increased. The U.S. Environmental Protection Agency has blue-green algal toxins on its Candidate Contaminate List that would bring new regulatory measures for surface water.

A draft version of the technical note is currently under review. The note will be distributed in print after revisions are completed.

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Interagency Technical Reference on Rangeland Health Released

“Interpreting Indicators of Rangeland Health, Version 3,” an interagency technical reference, has been published and released. The concepts and procedures described in the technical reference provide methodology for qualitatively interpreting 17 different indicators into 3 attributes of rangeland health. The Rangeland Ecological Site Description is the standard by which all interpretation is done. The three attributes of rangeland health deal with the ecological processes of the ecological site and are represented by the soil/site stability, hydrologic function, and biotic integrity of the site.

Determinations of rangeland health have become a part of the inventory phase of the conservation planning process with NRCS when working with rangeland landowners.

This technical reference, along with chapter 4 of the National Range and Pasture Handbook (NRPH), will provide the guidance necessary to accomplish this part of the planning process. The Rangeland Health section in chapter 4 of the NRPH is being revised to include these new, more complete concepts and methodologies.

“Interpreting Indicators of Rangeland Health, Version 3” was at least 6 years in development. The concepts and methodology have been extensively tested across the United States and thoroughly reviewed by the research community. Interagency coordination, among the Natural Resources Conservation Service, Bureau of Land Management, Agricultural Research Service, and United States Geological Survey - Forest and Rangeland Ecosystem Science Center, was essential to the completion of this document. Printed copies are available from the Grazing Lands Technology Institute (GLTI) office in Fort Worth, Texas by emailing djohnson@ftw.nrcs.usda.gov. The technical reference is also available electronically from the GLTI web site at: <http://www.ftw.nrcs.usda.gov/glti/pubs.html> The technical reference can be downloaded from: <ftp://ftp.ftw.nrcs.usda.gov/pub/glti/IntIndRangeHealth.pdf>

For more information, or with questions, contact:

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Listserv Facilitates Soil Quality Information Exchange

The Soil Quality Institute (SQI) recently established an e-mail listserv called “SQIforum” to facilitate communication among NRCS employees and partner conservationists. Any subscriber may post announcements and questions related to the research and application of soil quality technology. Then, those announcements and questions are automatically distributed to all other subscribers to the listserv. The Institute will post announcements of new products and web site updates.

To subscribe to the listserv, send an e-mail message to: listproc@nrcs.usda.gov. In the body of the message write: “subscribe SQIforum [your first and last name].”

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PLANTS Improves Photo Gallery Selection Interface

Responding to user comments, the National Plant Data Center and the Information Technology Center have improved the selection interface on the Photo Gallery <<http://plants.usda.gov/plants/gallery.html>>. The list of available images by plant name that results from an inquiry provides the number of available images of that plant. If “thumbnails” are selected, they are shown in alphabetical order for the selection criteria used.

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TECHNOLOGY TRANSFER

National Plant Data Center Collaborates on the National Atlas

The National Plant Data Center (NPDC) has collaborated with the United States Geological Survey, Biological Resources Division, on a demonstration within the National Atlas at <<http://www.nationalatlas.gov/>>. The Natural Resources Conservation Service is a partner on the project.

The NPDC provided data layers for several introduced invasive plants. An example is Chinese privet at <<http://www.nationalatlas.gov/wdligum.html>>. The Atlas links to the PLANTS Plant Profile for the species so that web site visitors have access to additional information.

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Software Developments Will Improve Flood Damage Assessments

FloodEcon is a flood damage estimation software program under development by the National Water and Climate Center (NWCC). It interfaces directly with the HEC-RAS hydraulic software program developed by the Corps of Engineers. FloodEcon combines the capabilities of URB1 and ECON2 so that structure, content, and crop damage can all be estimated using the same model. It also provides significant improvements in data entry and in model stability and robustness.

State economists from Maryland, Arizona, and California performed advance testing and proofing of the FloodEcon model. Although not yet available for mass distribution, FloodEcon was demonstrated at the Northern Plains Region Economic Technology Workshop in April. The National Water Management Center will coordinate feedback from users with NWCC programmers, assist with the development of needed documentation for users and trainers, and provide direct assistance to state personnel using FloodEcon.

For more information, or if you are interested in serving as a beta tester, contact:

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Grazing Lands Technology Institute Product and Service Benefits Regional Initiative

Aided by the National Range and Pasture Handbook, developed under the leadership of the Grazing Lands Technology Institute (GLTI), and direct assistance from GLTI staff, the Northern Plains Region is in the second year of a 7-year initiative to develop or update more than 2,000 ecological site descriptions and about 1,000 forage suitability group descriptions. Accurate descriptions will help NRCS field staff provide better technical assistance on grazing lands when helping producers make informed resource management decisions. These descriptions should be a primary part of the Field Office Technical Guide (section II) in every field office in the United States.

NRCS partners and customers in the Northern Plains Region are now being involved to make sure the final products are both accurate and useable by all potential users. Local work groups are developing draft ecological site descriptions based on available data and field experience. The descriptions will be verified, refined, and further described as knowledge and experience are gained.

A progress report on the Northern Plains Region initiative is available at its web site <www.np.nrcs.usda.gov>. More information on ecological sites and forage suitability groups can be found in the Grazing Lands Technology web site <www.ftw.nrcs.usda.gov/glti/homepage.html>.

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PLANTS Continues to Grow

During February, the PLANTS web site received over 2.2 million hits and served nearly 860,000 pages of information. The site hosted 93,000 user sessions to over 38,000 unique visitors, who spent nearly 4,916 visitor hours utilizing information.

In addition, PLANTS continues to broaden its customer outreach. Most recently, Minnesota Grown Opportunities, a collaboration that provides information on diversification options for Minnesota farmers and others, offered to feature the PLANTS site on its web site <http://www.mgo.umn.edu>.

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Survey Confirms Increase of Crop Residue Management Practices

During 2000, the NRCS Ecological Sciences Division and participating state and field offices assisted in the 2000 National Crop Residue Management Survey. Field data were gathered to assess the adoption of crop residue management practices.

The survey revealed that the number of U.S. cropland acres planted with no-till has increased from 17 million in 1990 to 52 million acres today, accounting for 17.5 percent of the planted acres. Use of no-till in the U.S. increased 4.4 million acres in the last 2 years. Soybeans and corn are the most popular crops planted to no-till, but no-till cotton acres also increased significantly in the last 2 years. Mulch-till (full-width tillage that leaves more than 30 percent residue) was used on 18 percent of the planted acres and 1.2 percent of the planted acreage used ridge-till (planting on ridges formed during cultivation in the previous year). Overall, conservation tillage was used on 36.7 percent of the planted acreage in 2000. This is just one example of how the science and technology that NRCS delivers helps to bring about change in the landscape. The adoption of conservation tillage is promoted through NRCS technical assistance and the technology transfer efforts of Science and Technology's Ecological Sciences Division.

The results of this survey have been compiled by the Conservation Technology Information Center. Each state office should have received a copy of the survey report, along with a CD-ROM.

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TRAINING

Supercharged Leadership Training Continues

“The Leader in You” satellite broadcast training continues this month with “Supercharger 2001 – Motivating the Motivators” and “On Leadership.” The final installment, “Stress Mastery,” will air in June. This series, sponsored by the Social Sciences Institute and its partners, offers a timely staff development opportunity at no cost to NRCS field staff, conservation district directors and staff, and state conservation agency personnel.

“Supercharger 2001” will be broadcast from 1 to 3 p.m. ET on Thursday, May 3. Frank Ingo, a Disney trainer and an award-winning educator, with an extensive background in psychology, is an energetic presenter. Ingo will help participants motivate themselves and others to success. The presentation objectives include learning how to turn fear into excitement and to “learn how to charge, recharge, supercharge, and stay charged.”

“On Leadership” will be broadcast from 11:00 a.m. -12:30 p.m. ET on Wednesday, May 16. The presenter, Warren Bennis, has advised four U.S. presidents and is founding chairman of The Leadership Institute at UCLA. He has authored or edited over 25 books on leadership and is one of the world’s foremost authorities on the subject. Understanding the critical success factors to lead now and into the future is one of this presentation’s training goals.

Satellite broadcast coordinates and information about the handouts will be provided to NRCS employees, districts, and state conservation agencies as soon as they are available. There is no cost to view the training over satellite transmission, and taping rights are available.

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