

It's About People



2003 Annual Highlights
NDSU Extension Service • North Dakota Agricultural Experiment Station

NDSU
North Dakota State University

Can you imagine...

spending your entire professional life studying weeds? Perhaps you'd rather spend hours learning the basics of digital cameras, global positioning system units, Internet servers and CD-DVD drives so you can try to stay a step ahead of tech-savvy 4-H'ers. If you can't imagine doing either of those, you're not alone.

How about dedicating your life to helping people? You work hard to improve their lives, to help them educate their children and to better themselves. It's your job to help them make their environment cleaner, their farms and businesses more profitable, and to improve the quality of their lives.

That's something you can imagine and aspire to. The faculty and staff of the NDSU Extension Service and the North Dakota Agricultural Experiment Station aspire to that calling too.

And even though the faculty and staff specialize in weed science, technology, range management, entomology, plant breeding or dozens of other specialties, their real jobs are about people and improving their lives.

Our faculty and staff know the state. They meet with advisory boards and panels. They listen to questions and concerns. With 53 county extension offices across the state, some of our staff may be your neighbors. They live and work in your community or neighborhood. Eight research extension centers in the state allow researchers to study local problems and demonstrate new ideas under local conditions.

You may have met some of our staff at field days and seminars, or shared suggestions or questions with them over e-mail. Perhaps you've looked for ideas and guidance on one of our many Web pages. With high-speed Internet access at most of our county extension offices and growing two-way videoconferencing capabilities, the full power of NDSU's research and outreach specialists is closer than ever.

This report is a sampling of the efforts of the NDSU Extension Service and the North Dakota Agricultural Experiment Station. We hope it gives you a flavor of our work and a glimpse of how we work with people across the region. Many of these projects involve cooperation with other universities, agencies, businesses and individuals, but they all have the same focus – improving the lives of North Dakotans and their neighbors throughout the world.



Patricia Jensen, Jim Venette, Sharon Anderson and Ken Grafton

If you would like more information on the programs in this publication, contact the faculty and staff listed on the corresponding pages. If you would like more information about our other programs or have other questions, comments or suggestions, please contact any one of us.

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His Life Is Weeds



In some circles, he is known as “Mr. Spurge.” His real name is Rod Lym, NDSU invasive weeds specialist and professor in the Department of Plant Sciences.

He gained his reputation as “Mr. Spurge” by working to control leafy spurge for the past 24 years. Lym came to NDSU in 1979 to do post-doctorate work and has been at the university ever since. “When I came here, there was a large leafy spurge symposium held in Bismarck,” Lym says. “Spurge brought a lot of government entities together with private interests to take on the problem.”

After that symposium, H. Roald Lund, then director of the North Dakota Agricultural Experiment Station, formed a leafy spurge team that included Lym. “The thinking was that pathogens would be the biological agent used to control leafy spurge, but that never happened. Several pathogens were identified, but other crops, such as alfalfa, are also susceptible,” Lym says.

The fight against leafy spurge continued. “We now have enough tools in our toolbox so that anyone that wants to control leafy spurge can do it,” Lym says.

“Hard data beginning in the 1960s showed that acres infested with leafy spurge were doubling every 10 years. Now some counties are reporting a decrease in the number of infested acres. The reduction is due to the combined efforts of research, coordination and cost-share programs from the N.D. Department of Agriculture, and work by county weed officers and land managers statewide.”

Research on leafy spurge continues at NDSU. It involves biocontrols such as the flea beetle and competitive grasses to stop the spread of leafy spurge.

“Currently, we’re in the third year of a five-year study which combines the use of flea beetles, herbicides and competitive native grasses,” Lym says. “We have data showing that these combinations give us more rapid and long-term control.”

A big change in the fight against invasive weeds came in the early 1980s. “The Legislature created the weed control law so now every county has a weed control officer,” Lym says. “Now, as other weeds come into the state, we can identify them quickly and control them before they spread.”

As an example, Lym says one of his former students, Denise Markle, who now works at the NDSU North Central Research Extension Center at Minot, had some yellow star thistle show up on her desk. “She knew what it was so the fields were isolated and the plants eliminated. It’s not an issue in North Dakota, while in California they have 11 million acres of it.”

Bill Ragan, Stutsman County weed control officer, agrees that quickly identifying a problem is key to controlling new weeds. “Our newest weed is yellow toad flax. It costs about \$36 per acre to control, but we found it early enough in small patches so it’s not expensive to eliminate.”

Ragan also gives Lym a great deal of credit for his work. “We get advice from chemical companies on controlling weeds, but we look to Rod to give us an unbiased opinion. He does the research and gives us the results.”

Chad Prosser, exotic plant management specialist for the National Park Service based at Theodore Roosevelt National Park, agrees. “He has provided us, on hundreds of occasions, advice on how we should approach and deal with invasive weeds. Without his expertise and willingness to work with the National Park Service, we would not be where we are today in controlling weeds in the park.”

Lym has test plots in the park that aren’t that easy to get to, Prosser says. “The plots in the South Unit are a mile from the road so we have to hike to the site. When you’re bringing out soil samples and it’s 95 degrees, it gets to be a lot of work.”

Weed control is a team effort, Lym says. He credits many others in the battle against weeds. One of those is Kathy Christianson who has worked with Lym as a technician since 1983. She does day-to-day field and greenhouse work.

Right now the top weed problem in North Dakota economically is Canada thistle. “It’s been a huge problem since the early ’90s because of all the wet falls we’ve had,” Lym says. “There is probably 6 to 7 million acres in the state that have Canada thistle.”

But if there is a nightmare weed, one that would keep Lym awake at night, it would be saltcedar. It is an invasive, non-native plant that has caused problems in several Western states. It grows along riverbanks and lakes. It can use 200 to 300 gallons of water a day and exudes salty water from its leaves, increasing the salinity of the surrounding soil. Some lakes in New Mexico went dry when saltcedar started growing along the edges, Lym says.

Saltcedar was sold as an ornamental but has now been added to the state’s noxious weed list. It’s the second ornamental on the list, joining purple loosestrife. “Our new problems — saltcedar, purple loosestrife, toad flaxes — are ornamentals that have escaped. Some of our problems are actually coming out of people’s gardens,” Lym says.

Having waged a war against invasive weeds most of his life hasn’t prompted Lym to hate all weeds. “Milkweed might be an example,” Lym says. “Farmers don’t really like it, and it doesn’t look good in a field, but we’ve never really been able to document crop loss due to milkweed. Plus, it’s the major source of food for the monarch butterfly.”

After 24 years on the job, Lym says he still enjoys it. “I get to travel to the most beautiful areas of the state from the Theodore Roosevelt National Park to the Pembina Gorge. It’s a lot of fun.”

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Workers at Theodore Roosevelt National Park use NDSU advice and research in their weed control efforts.

Canada Thistle Creates Big Yield Loss in Hard Red Spring Wheat

Data from a just-released weed survey show Canada thistle caused more yield loss in spring wheat, durum and barley than any other weed, according to Rich Zollinger, NDSU Extension Service weed specialist. “According to the survey, the yield loss was 35.5 million bushels.”

A similar survey conducted in 1978 and 1979 showed wild oat caused the most yield loss in spring wheat, durum and barley. Yield loss from Canada thistle during that survey was 9 million bushels.

Other weeds that are causing considerable damage, according to the survey, are wild oat, field bindweed, common milkweed, kochia, and green and yellow foxtail.

“The infestation frequency for Canada thistle, field bindweed and common milkweed was much less than some other weeds, such as wild oat or foxtail,” according to Zollinger. “However, they are more than twice as competitive, causing greater yield losses in small grains.”

The average total yield loss in spring wheat, durum and barley in 1978 and 1979 from seven weeds, where loss information is available, was 55.6 million bushels. Those same seven weeds reduced yields by 83.4 million bushels in the latest survey.

Weeds added to the list in the survey include lanceleaf sage, eastern black nightshade, Venice mallow, swamp smartweed, biennial wormwood, waterhemp and yellow nutsedge.

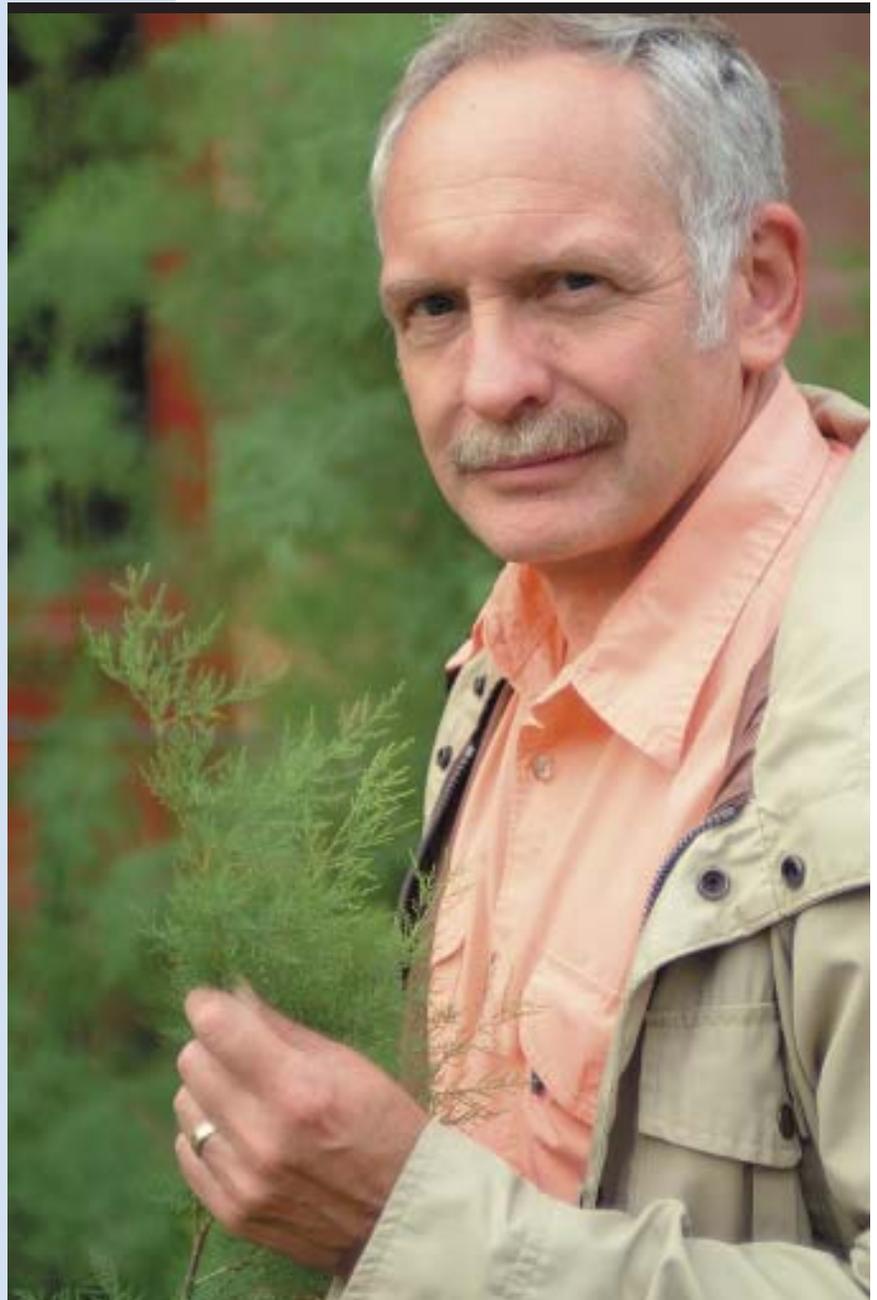
Weeds that were reported in the 1978 and 1979 survey but were no longer found in the current survey were wild prairie rose and night-flowering catchfly.

“Information gathered in the survey gives us important information to use when we seek Section 18 emergency approvals,” Zollinger says. Section 18 “emergency” and “crisis” exemptions from registration are used when emergency or crisis pest situations arise for which no pesticide is registered with the North Dakota Department of Agriculture. Both types of exemptions from registration allow use of a pesticide for a non-registered purpose for a specified period of time.

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Rod Lym with saltcedar, an invasive, non-native plant originally sold as an ornamental.



Jesse Handegard,
Adams County
extension agent, counts
on expertise from the
NDSU Plant Diagnostic
Lab when helping
producers solve crop
problems.



Pinpointing Plant Problems

Today it's like stepping into a cornfield as you enter the NDSU Plant Diagnostic Lab. The smell of fresh corn permeates the room and over in the corner are stalks of corn waiting to be tested. "It's different every day here at the lab, so you're going to see and smell different plants," says Cheryl Biller, plant diagnostician.

The lab, located on the NDSU campus, identifies weeds, insects, plant diseases and disorders, and makes management recommendations. Historically, the lab was set up for extension agents, but it's now used by many others. "Agents know the problems that occur in their counties, but if they find something unusual or if they're not sure about something, they'll send it into the lab for further analysis," Biller says.

Jesse Handegard, Adams County extension agent, agrees. "There are some diseases or insect problems that I just can't identify or make a diagnosis, so I send it to the lab. Also, some fungal diseases are just too small for me to identify."

The lab also provides service to co-ops, elevators, insurance agents, chemical company representatives, crop consultants and greenhouse managers, Biller says. "We also work with a lot of homeowners. Urban clients are bringing in samples from their yards because they're interested in keeping the green space around them healthy."

In the past few years, mold identification was added to the lab's services in response to flooding problems. A lot of people were concerned if the discoloration they saw was mold, Biller says.

One of the strengths of the lab is that it is located on the NDSU campus. "I really trust the specialists that I work with on campus, and we try to be a team as much as possible in assessing the problems that we see," Biller says.

Mike Carlson with UAP Northern Plains of Fargo has also extensively used the diagnostic lab. "Sometimes we need a second opinion on what we think the problem is," Carlson says. "In this crazy business of plant diseases and insects, there are problems that mask one another, so the lab is a good resource for that second opinion."

Carlson says he brings in, on average, a dozen samples a year to the lab for diagnosis. "There are occasions that we just walk in and discuss a problem to get a second opinion."

The diagnostic lab receives about 800 samples a year. During the winter, the lab focuses on seed health testing but still receives other samples. "You'd be amazed how many people notice problems with their trees during the winter months," Biller says.

Recently the lab became part of a national network to monitor intentional or unintentional introduction of pests or pathogens into the environment. "The USDA has created a National Plant Diagnostic Network to connect diagnostic facilities and experts within the nation's land-grant university system," Biller says. "The network will provide a central system to quickly detect pests and pathogens that have been introduced into agricultural and natural ecosystems. This is part of a new national program for homeland security."

The NDSU lab is part of the Great Plains Diagnostic Network. Member states include Colorado, Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Wyoming and an affiliation with Texas Tech University to monitor northern Texas.

In some cases, diagnosing a potential problem could take months, especially if it is a new disease. "Now we will be able to use all the expertise in our region to help us make sure that our preliminary assessment is accurate," Biller says.

Another important element is the establishment of a "first detector" network to help monitor the introduction of new or unusual plant and pest outbreaks. First detectors include growers, extension service personnel, crop consultants, pesticide applicators, commercial chemical and seed representatives, master gardeners, and others in plant growth or management.

First detectors will be trained to identify problems, Biller says. "They will also have access to a Web-based diagnostic system to report unusual occurrences, existing crop conditions or other information. They can also subscribe to an agricultural advisory system that provides warnings and information concerning pest outbreaks or weather conditions that could trigger outbreaks."

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Another important element is the establishment of a "first detector" network to help monitor the introduction of new or unusual plant and pest outbreaks.

NDSU Biosurveillance Initiative

NDSU, Dickinson State University (DSU) and the NDSU research extension centers at Dickinson and Hettinger are working collaboratively on a biosurveillance initiative. “Our goal is to rapidly identify, diagnose, contain or prevent a disease outbreak in North Dakota livestock and crops,” according to Doug Freeman, head of NDSU’s veterinary and microbiological sciences department.

“The potential threat of animal or plant disease introduction is significant since North Dakota has extensive livestock and crop industries,” Freeman says. “We have expansive open range with a large international border, a high volume of livestock imports, extensive movement of animals out of the state and a major crop export industry.”

Key initiative components are to:

- Enhance veterinary diagnostics
- Support infectious disease research
- Develop rapid response teams at the Dickinson and Hettinger research extension centers for livestock disease outbreaks
- Develop a state-of-the-art communication center at Dickinson State University
- Form a partnership between NDSU, DSU, the N.D. Department of Health, the N.D. state veterinarian and the N.D. Veterinary Reserve Corps
- Collaborate with regional and national diagnostics networks
- Enhance the capabilities of the NDSU Plant Diagnostic Lab
- Enhance extension training programs and disaster communication preparation

A key to the initiative is the new NDSU Veterinary Diagnostic Laboratory’s biosafety level 3 laboratory, which allows researchers to work with infectious organisms that can cause serious disease.

“Microbiologists will be able to expand diagnostic services. Research focused at the molecular level will address causes, diagnosis and prevention of infectious disease,” Freeman says.

At DSU, new methods for rapid communication and training for veterinarians, public health and regulatory officials, livestock producers and customs inspectors will be assessed and enhanced.

The rapid response teams at the Dickinson and Hettinger research extension centers will be equipped and trained to gather information and manage livestock disease outbreaks. The rapid response teams will also partner with the North Dakota Veterinary Reserve Corps and DSU.

The NDSU Extension Service will develop education programs for producers, veterinarians, border guards, law enforcement and other “first detector” groups.

“When the surveillance and containment strategies are in place, we will work with producers, public health agencies, law enforcement and the Immigration and Naturalization Service to develop and implement policies,” Freeman says.

The biosurveillance initiative is funded by a federal government relations grant through the office of North Dakota U.S. Senator Byron Dorgan.

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Cheryl Biller,
NDSU plant
diagnostician

Farm Bill Effort Helps Producers through Complex Process

The growth in acreage of soybean, corn and other crops in North Dakota, coupled with sweeping changes in the U.S. Farm Bill, left many farmers scratching their heads last spring regarding the optimum base and yield options to elect for their farms.

Deciding which of the five major options to use when enrolling in the Farm Bill had far-reaching implications for North Dakota producers who have received 15 to 18 percent of their farm income from government crop payments over the past decade. "The Farm Program as a percent of farm income is a bigger factor to North Dakota farms than in any other state. And producers will have to live with their decisions for at least six years, the life of this Farm Bill," says Dwight Aakre, an agricultural economist with the NDSU Extension Service.

From experience, Aakre and fellow economist Andrew Swenson knew the legislation would prompt a deluge of questions. Swenson focused his efforts on developing a spreadsheet to help producers evaluate Farm Bill options for their farms.

Other states were also developing software evaluation tools, but Swenson and Aakre decided to continue with their own. "We have a history as a trusted provider, and we wanted to make certain the software was easy to use and fit North Dakota," Swenson says. For the first time, minor oilseeds such as flax, canola and sunflowers

were fully covered under the Farm Bill. "We wanted to make sure those were addressed correctly in our software."

Meanwhile, Aakre trained extension agents. "We wanted our county agents to be well-trained and well-informed because they would be our front line of response."

Because of the complexity of the legislation, there was a number of issues that Farm Service Agency officials in Washington, D.C., needed to resolve. "In several cases during the development of the software our questions to the state and national FSA offices helped identify and settle those issues," Swenson recalled.

In McKenzie County, FSA County Executive Director Marcy Feilmeier and NDSU Extension Service Agent Dale Naze conducted training sessions for producers across the county. Then the FSA office referred producers to Naze so he could run the analysis before sign-up. "Everybody that came in here went to see Dale first," Feilmeier says. "Just about 99.9 percent of what came out of the analysis matched up exactly with what we needed. We could have done the analysis here, but we were already overwhelmed."

Naze completed analyses on more than 542 farm units, including several for out-of-state landowners that were completed via e-mail.

January, February and March saw a flood of farmers into county extension offices in advance of the April 1 deadline. "Basically all that I did during those months was walk

producers through the options," says Clint Gienger, NDSU Extension Service agent in Traill County. He helped producers evaluate Farm Bill options for more than 700 of the 1,000 farm units in Traill County operated by about 400 farmers. Because the software was also available on NDSU's Web site, additional farmers used the software themselves and then came to Gienger to assure that they had performed the analysis correctly.

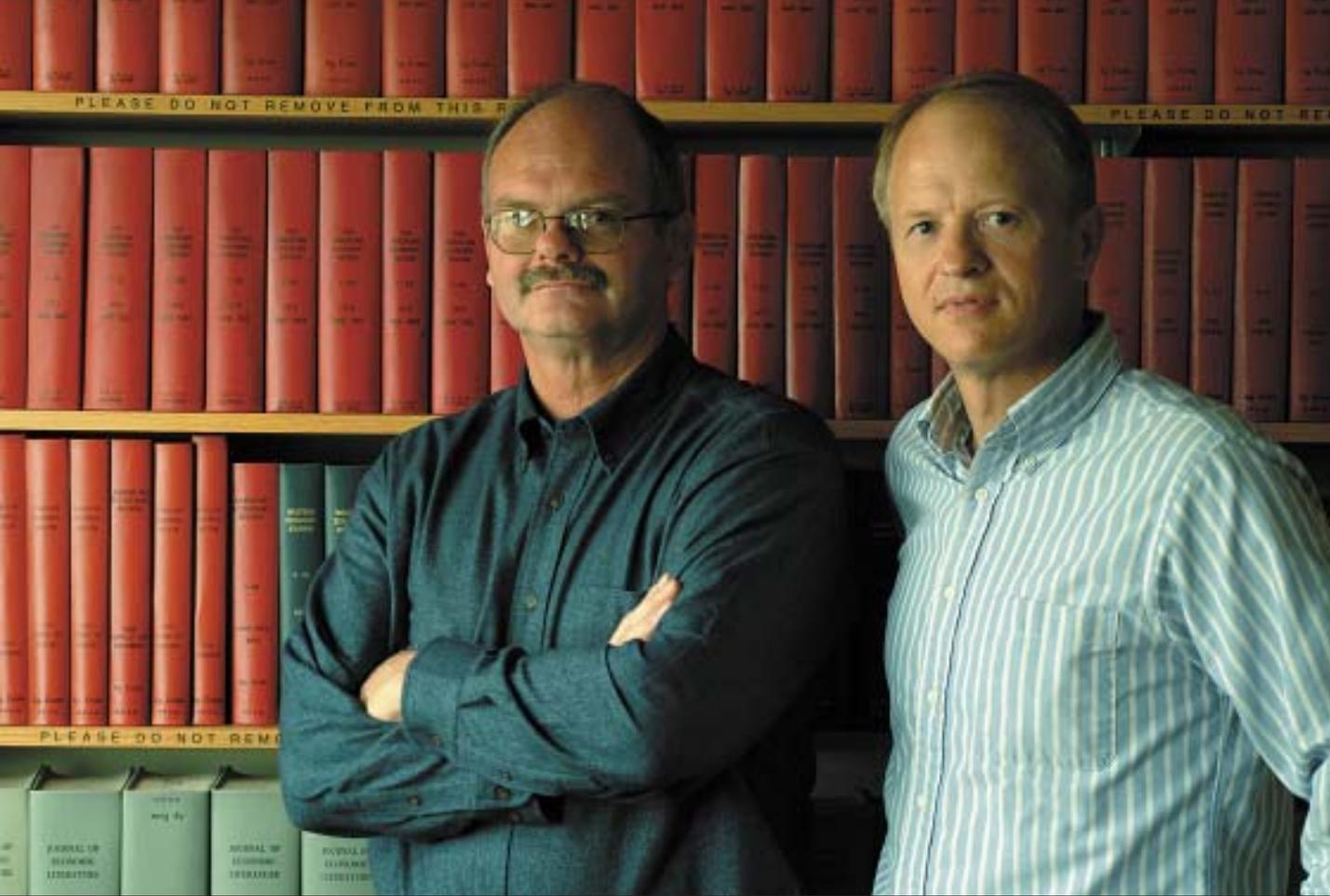
"Over the past five years, we've gone from primarily wheat and barley to corn and soybeans," Gienger says. "That complicated what was already a complex situation with the Farm Bill sign-up."

Swenson says extension staff and agricultural consultants from as far away as Virginia and Kansas used NDSU's software. Agricultural lenders used the software to help producers assure the most profitable decisions.

For Gienger, Naze and other NDSU extension agents, partial payoff came in the form of good public relations. "Agents saw producers from their counties that they'd never seen before," Aakre says. "It raised the awareness of what extension can do and the service we offer."

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Agricultural lenders used the software to help producers assure the most profitable decisions.



Dwight Aakre and Andrew Swenson prepared extension agents and others to help producers determine the best sign-up option in the Farm Bill.

Farm Bill Input

NDSU had an influence on the new Farm Bill as it was being written. The Center for Agricultural Policy and Trade Studies was created two years ago to conduct in-depth analysis of agricultural policies and their implications for farm income and the agricultural economy in North Dakota and the region.

The center's mission also is to evaluate trade policies and their effects on North Dakota. "The center is unique because

its research deals with agricultural policies under globalization," says Won Koo, director of the center.

Because of the center's unique mission, U.S. Senator Kent Conrad, a member of the Senate Agriculture Committee, asked the center to evaluate various versions of the 2002 Farm Bill. With debate on proposals under way, rapid analysis was essential. Koo and research associate Richard Taylor typically completed analyses on proposed Farm Bill options within a week. The center evaluated six to seven different proposals. With the analysis in hand, Conrad and others on the committee could better assess policy options and their impacts on the region.

Koo and Taylor use computerized farm sector models to evaluate how policy changes will affect North Dakota. The models build on projections provided by nationwide models at the Food and Agricultural Policy Institute at Iowa State University and the University of Missouri.

"We have a unique set of commodities and markets that need to be considered for an accurate analysis," Koo says. Often the models are used to make periodic forecasts of farm commodity markets, the impact on producers and the agricultural economy. Similarly, the models show how changes in policies can influence North Dakota.

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Economist
Won Koo
directed analysis
on Farm Bill
proposals.

Exploring Sustainable Agriculture

Duane and Chantra Boehm have found success with less on their farm near Richardton. They raise their certified organic crops with no pesticides or man-made fertilizers.

The Boehms enjoy niche markets for organically produced products and believe the economic viability of their products can best be indicated by profit enjoyed by all participants in their business venture. “The markets are out there and growing,” says Duane. “If you develop positive relationships with folks and supply their needs, everyone is successful.”

Their farm includes small grains and beef cattle. They are part of a growing number of producers and consumers who desire food and fiber products produced through sustainable agriculture. The Boehms began moving toward organic farming 15 years ago.

Establishing relationships with those who market products is instrumental to remaining sustainable, according to Tom Hanson, sustainable agriculture coordinator for the NDSU Extension Service. Sustainable agriculture is not only profitable and environmentally sound, but has social benefits as well. “Community and sustainable agriculture serve one another; one is successful because the other one is as well,” he says.

NDSU’s Dickinson Research Extension Center tests hard red spring wheat and oat varieties on the Boehm’s land. The Boehms find the variety recommendations useful because aggressive varieties are necessary when herbicides are eliminated in organic systems.

Other trials at the Dickinson Research Extension Center include a 67-acre grazing study comparing pasture-based cropping systems, as well as a new 8-acre tract that will be certified organic within three years.

Those studies augment other long-term NDSU efforts to study inputs. Scientists study management practices that reduce the need for pesticides. The use of grazing and flea beetles to control leafy spurge is a successful example. Crop breeding efforts focus on making plants more resistant to pests and diseases. NDSU research on spray additives has led to reduced rate recommendations. Other efforts focus on better management of fertilizer to maximize yields and minimize environmental impact.

On one rotation plot at the Dickinson Research Extension Center, no synthetic fertilizer or pesticide has been used since 1999. Pat Carr, center agronomist, says yields have been competitive, but weeds have posed a problem, making crop rotation essential.

The Boehms rotate their wheat, oats, rye, field peas, buckwheat and millet to prevent pests and diseases. Grazing is part of the rotation equation on grass, hay and cropland. They also use cattle waste as natural fertilizer.

Duane admits organic production is challenging and requires extensive planning. “It works for us, but everyone is unique.”

Brad Brummond, NDSU Extension Service agent in Walsh County specializing in sustainable agriculture, notes, “Sustainable agriculture is seeing more play in conventional systems through tactics such as rotation and identity-preserved marketing. The key is to reduce input.”

Hanson works with the USDA’s Sustainable Agriculture Research and Education program on grants for professional development, research and education, and producer-oriented projects and seminars. “Ultimately, we hope to provide the knowledge to create systems that reduce insect and disease cycles.”

Kris Ringwall, director of the Dickinson Research Extension Center, says the center recently expanded its mission to include developing sustainable and integrated production strategies for western North Dakota, increasing atmospheric carbon sequestered in the region’s rangeland, enhancing value for commodities produced from forage-based systems and providing sustainable individual lifestyles in viable rural communities.

“We need an integrated view of agricultural systems,” Ringwall says. “Agriculture must not only become more efficient, it also has to monitor impacts on soil and water quality. It may also need to pull carbon from the air to offset the industrialization and concentration of the world’s population. Other benefits of more sustainable systems could be a reduced dependence on non-renewable fuels and decentralizing food production.”

The implications, he says, reach far beyond the research center, the Boehm’s farm and North Dakota.

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Sustainable agriculture is not only profitable and environmentally sound, but has social benefits as well.



Agronomist Pat Carr oversees expanding sustainable agriculture research at the NDSU Dickinson Research Extension Center.

Exploring New Technology

Work continues at NDSU to ensure that if biotech wheat is commercialized, it won't jeopardize other crop production and marketing systems used in North Dakota. Work on the project is a cooperative effort between the Northern Plains Sustainable Agriculture Society; Monsanto; International Certification Services Inc., an organization that certifies organic crops; and NDSU.

The group is identifying and developing best management practices (BMPs) so producers and grain marketers can avoid cross-mixing of grain. The group meets quarterly to define the issues, recommend solutions and develop a BMP handbook. The handbook will be given to stakeholders who will work with farmers and others to educate and implement the BMPs.

The North Dakota Agricultural Experiment Station is evaluating Roundup Ready® hard red spring wheat at its Langdon Research Extension Center and Dalrymple Research Site near Casselton. The seed being tested has been altered, through biotechnology, to increase its resistance to the herbicide Roundup, which would allow producers to spray the weed killer without harming the crop.

A project to explore the ethical, economic and social aspects of biotechnology also is continuing at NDSU and the Cankdeska Cikana Community College at Fort Totten. Eight other universities in five states are also part of the project.

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Duane and Chantra Boehm, Richardton, raise certified organic crops and host NDSU wheat and oat trials.

Mollie Fearing,
Marcus Fearing and
Vance Nygard consult
on GPS readings.
They are members of
the Williams County
4-H Tech Team.



Keeping Teens Wired

Today's teenagers have never known a world without computers and related technology, and they seem to have an insatiable appetite to learn more.

To feed that need, the NDSU Extension Service is organizing 4-H Tech Teams across the state. There are also state- and national-level tech teams.

Kayla Lisburg of Leonard was a member of Cass County's tech team and then joined the state tech team in June. "I've been in 4-H for 13 years," she says. "Joining the state tech team gives me a chance to expand my leadership skills, meet new people and be part of a team effort."

Members of the state tech team have specialties. Some, like Wyatt Kramm, also of Cass County, specialize in computer hardware. He's developed a curriculum for 4-H'ers | called Computer in a Box that teaches youth how to assemble working computers from unassembled components.

Lisburg's specialty is Web design and assembly, a skill she learned at Central Cass High School and honed as a tech team member. She's attending the North Dakota State College of Science to turn her interest into a career.

Lisburg and Kramm had opportunities to teach their skills to other students during technology camp. Teaching and helping is a significant part of the tech team mission. Extension Agent Nancy Bollingberg has a dozen 4-H members in a tech team in Wells County, one of 10 county tech teams across the state. They've learned lessons on Internet safety, Web page design and maintaining computers. "I've had the students teach the classes," Bollingberg says. "Our goal is to take what we've learned to help people in the community."

Students have a strong interest in global positioning systems (GPS) and geographic information systems (GIS). NDSU's leadership in that area was recently recognized when Sun Microsystems donated \$20,000 in computer equipment to enhance students' ability to use GPS and GIS.

"Youth are learning that geography is not just a matter of pinpointing a national capital on a map, but can be hands-on fun projects that relate to their everyday lives and environment," says Angie Milakovic, 4-H youth technology specialist and state tech team coordinator.

Extension Agent Linda Hauge works with youth in McKenzie and Williams counties to hone their GPS skills. Tech team members apply the satellite mapping systems to practical problems like measuring fields and calculating angles. She's developing a curriculum for local math teachers that

incorporates technology like GPS with math skills. It's a natural, she says, for tech-hungry students.

"That's the appeal of tech teams," says Milakovic. "The activities are all very hands-on." In addition to computer, Internet and GPS applications, activities feature LEGO robots, digital photography, homemade hot-air balloons, aerospace, and other science and technology activities.

"From the lessons we teach, to the Web site we manage, to having online meetings, we use technology any way we can," Milakovic says.

North Dakota's effort is part of a national extension service initiative to give youth the skills to be leaders in technology. Two of North Dakota's tech team members, Martin Platz of Devils Lake and Amy Indridason of Cavalier, are now on a national team.

Through participation in the national programs, North Dakota tech team members have learned that their technical skills and creative abilities are on par with any in the nation, Milakovic says.

"The tech team projects are a way for youth to learn and give back to the community – something that's been a focus of 4-H all along."

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Our goal is to take what we've learned to help people in the community.

North Dakota 4-H and Tech Teams by the Numbers

10 County tech teams in North Dakota.

37 Percentage of youth age 6 to 17 participating in extension youth programs.

100 Number of students asking questions during a Web chat between U.S. Senator Byron Dorgan and high school government classes at Linton, Bowdon/Fessenden and Richardton/Taylor. The chat was hosted by the state tech team in May.

100+ North Dakota students participating in tech teams.

200+ Hours of state tech team volunteer time in the past year.

6,127 Number of youth enrolled in North Dakota 4-H clubs.

42,072 Number of youth participating in extension youth programs through clubs, school enrichment, camps, individual study or special interest.

Angie Milakovic, 4-H youth technology specialist
and coordinator of the tech teams



Researchers draw blood sample from bison near Fort Yates. Scientists are also studying how high-selenium diets influence bison meat.



Beefing Up Nutrition

Beef producers on the Northern Plains have always had to manage around land that had soil with high levels of selenium. In some cases, they had to fence off those pockets of land because the selenium posed a poisoning danger to their cattle.

Now NDSU researchers are studying whether that liability can be turned into opportunity. Human nutrition research shows that selenium is a potent anti-cancer compound. “We’re trying to increase the content of selenium in beef,” explains Marty Marchello, a meat scientist in the Department of Animal and Range Sciences. “Beef is one of the best sources of selenium in the human diet. If we could increase the selenium content, that could be used in marketing.” A healthy niche for beef could provide a lucrative specialty market for cattle producers.

Historically, most livestock research focused on selenium’s toxicity. “The threshold between nutritional requirements for selenium and toxicity is relatively narrow,” explains Joel Caton, a nutrition specialist in the Department of Animal and Range Sciences. “And the problem of selenium toxicity goes back a long way. In fact, Marco Polo described symptoms of selenium toxicity in his horses as he documented his journeys across the Asian steppes.”

But in 1996, medical researchers found that “supranutritional” levels of selenium in the human diet could reduce the incidence of cancer. He saw reductions of up to 70 percent in prostate cancer and up to 50 percent reductions in colorectal cancer. “Those studies really propelled selenium into the nutritional medical field,” Caton says.

The challenge for livestock researchers was how to boost the level of selenium in beef, which, along with wheat, provides a large portion of selenium in the human diet. “We all

know that North Dakota’s all about beef and wheat,” Caton says

Caton worked with NDSU Extension Service Beef Specialist Greg Lardy to survey range plants from selenium-rich soils to determine if the selenium in the soil was taken up into plants. Early work was promising so the effort was expanded with a \$1.7 million grant from the USDA’s Initiative for Future Agriculture and Food Systems. Now the research involves collaborators from several universities and USDA centers across the Northern Plains including NDSU, the Human Nutrition Research Center in Grand Forks and the University of North Dakota.

With funding from another grant from the Initiative for Future Agriculture and Food Systems, NDSU Extension Service Range Specialist Kevin Sedivec is studying how high selenium diets influence bison meat. He is working with Fort Berthold Community College and Sitting Bull College in North Dakota and Sinta Gleska University in Rosebud, S.D., on the project. The three schools are affiliated with Native American tribes in the region.

“We knew that bison could be high in selenium, and anecdotes indicate that bison can store high levels of selenium in the muscle. Also, they graze on these high-selenium areas all year long,” Sedivec says. “Bison are the spiritual animal of the tribes, but cancer rates are above average for Native Americans.” This year, Sedivec and his group are collecting bison hair and blood samples to see how well they take up selenium. Next year, they’ll study selenium content in bison meat.

That will mirror the work Marchello is already doing with beef. He is studying the influence of high-selenium feeds on beef quality. Under his direction, taste panels evaluate high-selenium beef to determine if

it’s as juicy, tender and flavorful as traditionally fed beef. The researchers also evaluate color, bacteria growth and shelf life of high-selenium beef. In larger studies, taste-testers take home free steaks in return for filling out surveys. He also wants to know if people are aware of selenium’s health effects.

“We’re finding that people are not aware of the importance of selenium,” he says. “But we’re also finding that the acceptability is not affected by selenium in the meat.” In laboratory tests, Marchello found that high-selenium feeds could boost the selenium content of meat by up to five times.

The work is familiar ground for Marchello. He’s doing similar work with beef fed flaxseed, an abundant crop in North Dakota. The ability to put flaxseed’s cancer-fighting omega-3 fatty acids into beef could provide another healthy niche market for the state’s beef producers and boost demand for North Dakota-produced beef.

The work with selenium shows promise, but there are still unanswered questions. Caton and NDSU researchers Larry Reynolds and Dale Redmer are examining how selenium influences the growth of intestinal and reproductive tissues. Researchers believe selenium slows the growth of fast-growing cancerous tumors while reducing the blood flow to them. Intestinal and reproductive tissues also grow rapidly, and the researchers want to make sure there are no unhealthy effects from high levels of selenium.

“This takes agricultural research back to a traditional focus: producing more wholesome and healthful foods,” Caton says. “We’re very excited about that.”

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This work takes agricultural research back to a traditional focus: producing more wholesome and healthful foods.

Beef Center Closer to Reality

With a \$1 million boost from USDA Rural Development, the Beef Systems Science Center of Excellence is a step closer to reality at NDSU.

The USDA grant will be coupled with \$800,000 appropriated during the 2003 North Dakota legislative session. An estimated \$1.2 million is still needed to establish the center.

The center will be a small-scale meat processing facility that will help segments of the livestock industry add value to meat produced here and keep more of the value in North Dakota. NDSU faculty anticipate the facility will be built in cooperation with a business partner and be modeled after successful small-scale facilities that focus on product and worker safety, low costs and high productivity.

“With over 1 million head of feeder cattle produced every year in North Dakota, I believe the Beef Systems Science Center of Excellence will be a great benefit to NDSU and to the state of North Dakota,” says North Dakota Governor John Hoeven.

The facility will allow researchers to improve sire selection, breeding programs and feedlot management by looking at meat quality and value under various strategies. The facility will provide data for the development of commercial plants, including optimum plant size, payment formulas, test marketing and brand identification.

In the longer term, researchers will study innovations, such as robotics, that could reduce labor costs or improve safety. They could also study packaging and marketing innovations and new technology, such as video imaging and lasers that could improve product safety and quality. Scientists may also develop new products or practices that make meat safer, more convenient, and a better value for retailers and consumers.

The Beef System Science Center of Excellence will be established at NDSU with support from the North Dakota Stockmen’s Association, the North Dakota Association of Rural Electric Cooperatives and several state farm organizations.

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Marty Marchello, meat scientist, Department of Animal and Range Sciences

Flaxseed as Feed for Cattle



growers planted 750,000 acres to flax.

Carter also works with the North Dakota Oilseed Council as a consultant on flax research. The council, through a voluntary 2-cent per bushel check-off program, funds research projects.

Carter worked with Kansas State University researchers for four years on a project that adds flaxseed to cattle diets. Initial results show that flaxseed fed to cattle strengthens their immune system, improves carcass value through enhanced marbling and enhances the fatty acid profile.

Feeding flaxseed for 35 days prior to the finishing period reduced the mortality rate from shipping fever by almost half. Omega-3 polyunsaturated fatty acids in flaxseed helped suppress the elevated body temperatures and inflamed lungs that afflict cattle with shipping fever, a problem that costs the beef industry millions of dollars annually.

Flax added to the diet, at an 8- to 10-percent ratio, 35 days after arriving at the feedlot improved marbling. Improved marbling, or intramuscular fat, increases the value of the carcass because it is linked to tenderness, juiciness and flavor.

A benefit to the consumer is the increased omega-3 or "good fats" in the cattle's muscle tissue. Consumption of omega-3 fats may lower the risk of heart attacks and strokes in humans.

"I think research will show that the program will benefit other animals," Carter says. Flax is already used in pet food, and much flaxseed is consumed as "people food." A yellow-seeded flax variety, Omega, developed by NDSU and USDA cooperatively, is a very popular variety for human consumption.

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Communities to Develop Leadership

Three communities in North Dakota will design and implement leadership development programs with help from the St. Paul-based Northwest Area Foundation.

The NDSU Extension Service will receive \$330,000 from the foundation to help Ashley and Ellendale, N.D., and Eureka, S.D., develop programs in their communities. Grafton also is involved in the project along with Bagley and Red Lake Falls, Minn. Those communities will be served by the University of Minnesota Extension Service.

The program NDSU will use was developed by a team of leadership professionals and the Pew Foundation. Grant funds will cover

expenses for child care, transportation and educational resources as well as some salary for the coordinator and the local leader.

The towns are among 15 small, rural communities in North Dakota, South Dakota, Minnesota and Oregon that will pilot a new leadership development program designed to help reverse economic and population declines.

The communities and the organizations that will help them develop and implement the programs will receive \$1.7 million. The pilot phase is scheduled to last 18 months. During the next two years, the Northwest Area Foundation plans to expand the program to 40 communities with a total investment of more than \$4 million.

Gene Elhard, NDSU Extension Service agent in Dickey County, will lead the project in Ashley, Ellendale and Eureka. He will draw on expertise from the communities and from the NDSU and South Dakota State University extension services. Lynette Flage, an NDSU Extension Service specialist in Pembina County, will coordinate the NDSU Extension Service's participation in the project.

Local communities were instrumental in developing the proposal and offering suggestions for program delivery. Local advisory groups will direct the work.

"By building the leadership capacity of individuals within those communities, we can strengthen the community ownership which will draw young people back," says Karen Zotz, assistant director of the NDSU Extension Service. "Building leadership capacity will also provide opportunities for mentoring and coaching young people as they develop into the next generation of leaders."

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Fungicide Application Research on Small Grains

NDSU researchers are learning the most efficient and effective ways to spray herbicides and fungicides.

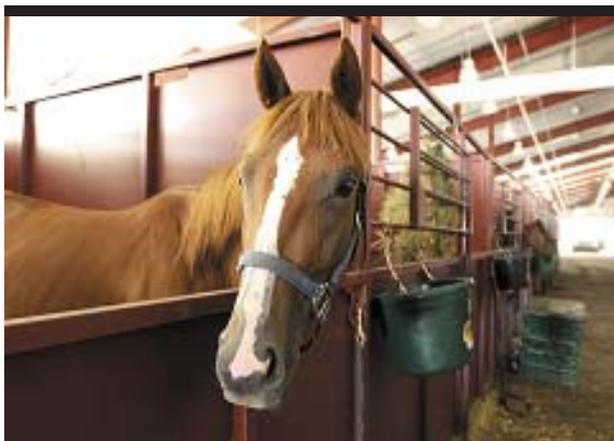
When spraying small grains, droplet size and the type of equipment used can make a big difference, says Scott Halley, NDSU Langdon Research Extension Center crop protection specialist. Halley's research focuses mainly on improving fungicide applications. He has been working on the project for several years with Vern Hofman, NDSU Extension Service agricultural engineer. Also working with Halley is Gary Van Ee, an engineer from Michigan State University.

"Technology has advanced so that we can now use air to carry the droplets to the target," Halley says. "Also, a higher volume of water has a different concentration of fungicide than low volume. We want to determine if a large droplet with a low fungicide concentration is more efficient than a small droplet with very high concentration of fungicide.

"There has always been the belief that if we can do a better job of applying the fungicide to disease-sensitive areas we can get better mileage out of our fungicide either through increased control or by reducing the spray rate," Halley says. "Reducing the spray rate would also be more environmentally attractive."

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NDSU Equine Program Has New Facilities

Students enrolled in the NDSU equine sciences program have a new horse stall barn they can use. "This will greatly enhance our educational capabilities," says Ken Odde, head of the Department of Animal and Range Sciences.

NDSU has had an equine program for some time, but it wasn't until 2001 that a major and minor in equine sciences were established. Since then the number of students enrolled has increased. The students gain experience in horsemanship and animal care as well as a broad perspective of the horse industry — how horses are used as recreational and commercial livestock, Odde says.

Construction on the 600- by 134-foot barn began in late November of last year and was completed earlier this summer. It is located adjacent to the new North Dakota Horse Park. There is a small arena at the site. However, long-term plans call for a large indoor arena to allow for expanded educational opportunities.

NDSU and the Horse Park Foundation are looking to expand the use of the track beyond racing. It is hoped that eventually other groups such as the North Dakota 4-H horse program will use the facilities. "The 4-H horse program is already very strong, and we see it as a natural fit for them to use this facility on occasion," Odde says. "We could host any number of equine events such as rodeos and competitions on a national level."

The equine program at NDSU is also linked to the NDSU Dickinson Research Extension Center. "There is a horse research program at the Dickinson center," Odde says.

"Our program is part of our continuing effort to provide assistance to people in the many different phases of agriculture," says Kris Ringwall, director of the Dickinson Research Extension Center. "There is a growing number of horse enthusiasts in the region, and we want to address their needs."

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Parent Resource Centers Reach Out

As parents face pressures and issues their parents and grandparents never dreamed of, four regional Parent Resource Centers are teaching parents new skills.

The centers are operated by the NDSU Extension Service and receive some grant-funded support from other entities such as the N.D. Department of Human Services, including the Substance Abuse and Mental Health Division and the Children and Family Services Division. They often also involve partnerships with school districts and other agencies that support children and families, and are designed to make family educational and support programs more accessible by bringing them together in one location. Class and educational material topics range from child health and development to techniques for parents to use in disciplining and teaching their children.

"The centers provide educational programming and partnerships specific to the most critical needs of families," says Sean Brotherson, a family life specialist with the NDSU Extension Service. He and Karin Bartoszuk, an NDSU Extension Service child and adolescent development specialist, provide support and guidance for the centers.

"Parent education is consistently rated as a top priority by professionals for helping children and families succeed. These resource centers are among the few organizations that focus on that," Brotherson says. "By bringing these resources and agencies together in partnerships, we help all of them fulfill their missions of developing a better environment for families and children."

The center in Grand Forks serves Grand Forks, Nelson, Pembina and Walsh counties. More than 91 percent of those responding to a recent survey said a newsletter published by the center was a valuable resource to them in their parenting or their professional work. Nearly 55 percent said they had significantly changed behavior to use more positive guidance and discipline with a child as a result of the newsletter.

Cass, Ransom, Richland, Sargent, Steele and Traill counties are served by a center in Fargo. That center recently held individual classes in partnership with the N.D. Department of Corrections, the YWCA Women's Shelter, the Southeast Human Services Center, the Nokomis Child Care Center, N.D. Job Service and the Eagles Kindergarten Center.

The Mandan center serves Burleigh, Emmons, Grant, Kidder, McLean, Mercer, Morton, Oliver, Sheridan and Sioux counties. That center is a partner in implementing a project designed to strengthen children, youth and families at risk through a grant from the U.S. Department of Agriculture for \$150,000 a year. A community site for the program will be in Sioux County where the effort will serve Native American children and their families.

Begun nearly a decade ago, the West Dakota Parent and Family Resource Center based in Dickinson is the oldest of the centers. It serves Adams, Bowman, Dunn, Golden Valley, Hettinger, Slope, Stark and Billings counties. A primary offering is the Children of Divorce class to help parents understand and reduce the negative impact of divorce on their children. A survey showed 93 percent of participants indicated the information in the class will influence the decisions they make regarding their children.

"The work going on illustrates the strength and importance of the resources, educational programs and partnerships developed at the parenting resource centers," Brotherson says.

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U.S. and World Wheat Economies Predicted to Improve



World demand for common and durum wheat through 2012 is expected to grow faster than world production, resulting in gradual increases in prices, according to two agricultural economists at North Dakota State University.

“World trade volumes of both classes of wheat are expected to expand, but trade volume for durum wheat may grow faster than common wheat,” says Won Koo, NDSU professor of agricultural economics and director of the Center for Agricultural Policy and Trade Studies.

Demand for common wheat will grow the fastest in China and Tunisia while demand for durum will grow the fastest in Algeria, according to Koo and the study’s co-author, Richard Taylor, an NDSU research associate.

“Import demand for common and durum wheat is largely based on optimistic income growth that ranges from 2.5 to 6 percent annually in developing and developed countries,” Koo says. “If the predicted income growth is not realized, import demand could grow slower than predicted, and estimated prices could be lower.”

The outlook projection is also based on an assumption that current farm and trade policies adopted by wheat exporting and importing countries will not change. However, there will be price fluctuations during the period.

U.S. durum exports are projected to increase 37.1 percent from 646,000 metric tons in 2000-02 to 886,000 metric tons in 2012. Common wheat exports are predicted to increase gradually from 22.8 million metric tons in 2000-02 to 25.9 million metric tons in 2012.

North Dakota produces approximately 80 percent of the durum and 60 percent of the hard red spring wheat produced in the United States.

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Looking for a Healthier Future

With nearly six out of every 10 North Dakota adults overweight or obese, the NDSU Extension Service established a task force to find ways of promoting healthy lifestyles among the state’s youth.

The task force was formed in 2002 and includes NDSU Extension Service agents, tribal college representatives, and faculty from NDSU’s health, nutrition and exercise science department, and the child development and family science department.

Their task is daunting. Almost 50 percent of North Dakota students in grades nine through 12 do not participate in even one physical education class during the school week and 42 percent do not eat even one serving of fruit or vegetables during the day. About 20 percent of students in grades nine through 12 are at risk for becoming overweight or are overweight. As a result, the number of cases of high blood pressure, elevated blood cholesterol and type 2 diabetes is rising.

“Our mission is to change the eating and physical activity patterns and environments of North Dakota children and families to promote healthy weight and consequently reduce the risk of chronic disease,” says Jane Edwards, a food and nutrition specialist with the extension service.

Based on recommendations from the task force, Edwards and others are developing fact sheets on soft drinks, portion sizes, and television and media use among youth. “These will provide background to schools, parents and others who make policies and decisions regarding youth. We want to help them make the best choices in creating a healthy environment for youth,” she says.

The group is also putting together recommendations for healthy alternatives to be included in concession stands at school and community events.

This summer, Sue Fagerholt, NDSU Extension Service agent in Walsh County, led the development of a partnership among local agencies to encourage healthy eating and exercise habits among area youth. The coalition, entitled PLAY (Positive Lifestyles for Active Youth), includes representatives from the schools; the hospital; the Women, Infants and Children (WIC) program; Headstart; parents; and others.

Members of the coalition will evaluate community resources for physical activity and healthy eating with a goal of creating an environment that encourages healthier lifestyles for youth. “We’re looking at what happens in Walsh County as a pilot project for what we could do in other areas of the state,” Edwards says.

To learn more about promoting healthy lifestyles for youth visit www.ext.nodak.edu/food/healthyweight/index.htm.

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New Wheat Variety Featured

Dapps, NDSU’s newest hard red spring wheat variety, was released by the North Dakota Agricultural Experiment Station last spring, and registered seed was produced throughout the state during the summer.

Research shows Dapps typically produces grain with 1 percent more protein than most varieties commonly grown in North Dakota. That characteristic makes Dapps an ideal variety for niche or identity-preserved markets. Dapps also has excellent milling and baking characteristics.

It has potential for maintaining a good level of protein even when grown with reduced levels of soil fertility, such as in some organic or low-input sustainable cropping systems.

The variety is susceptible to Fusarium head blight (scab) so it is best adapted to the western regions of the state where it is expected to replace the Grandin and Amidon varieties. Dapps is moderately susceptible to septoria, moderately resistant to wheat leaf rust and tan spot, and has good resistance to stem rust.

Dapps is named after Bert D’Appolonia, professor emeritus of cereal science at NDSU. D’Appolonia was and continues to be a strong proponent of high-quality spring wheat cultivars.

Dapps resulted from a cross between Kitt, Amidon, Grandin and Stoa, according to Mohamed Mergoum, NDSU’s hard red spring wheat breeder. The initial crosses began in 1993.

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Photo courtesy of The Forum

Supporting Corn's Growth

North Dakota producers harvested about 1.25 million acres of corn this year, marking a continued increase in the state's corn crop. Changing weather patterns, increased disease in small grains and NDSU research are contributing to that growth.

Increased productivity of early maturing corn is the major factor driving corn's expanded acreage, says Marcelo Carena, NDSU's corn breeder. "We now realize that early corn has similar genetic potential to late corn. Producers, as well as the industry, are more committed to early corn and its economic potential." Also fueling the corn boom is a growth in diseases like scab. Producers are looking to crops in rotation, such as corn and soybeans, to break the disease cycle.

NDSU has been developing corn inbreds for about 80 years. The corn breeding program at NDSU releases adapted inbreds to the industry. Corn breeding companies use those inbreds to develop hybrids for producers. NDSU also conducts hybrid corn trials that help producers select correct hybrids for their areas.

"NDSU's active corn breeding program is essential to support the growth of corn production in the state," Carena says.

The corn breeding program tests thousands of inbred lines every year. Only one or two lines make it after three to five years of vigorous testing at locations across the state. Inbred testing is conducted to obtain elite inbred lines. Data are collected for 31 traits including disease resistance, maturity, stalk and root lodging, ear quality and seed set. Researchers also test for herbicide damage, drought and cold tolerance, and salt tolerance. Trials are also conducted in Canada and Europe prior to releasing a line. The number of tests and the variety of locations increase the odds that an inbred line's weaknesses will be exposed before it is released.

The inbred is crossed with commercial and public testers to make hybrids. The hybrids are analyzed at various North Dakota locations for characteristics such as yield, moisture, lodging resistance and test weight.

As corn production continues to swell in the state, disease and pest problems are likely to grow as well, Carena notes. The state's short crop season, low temperatures and low rainfall compared to other Corn Belt states will also be challenges. "Our corn breeding program will continue to develop genetic material that will help producers deal with those challenges so that corn production can remain sustainable in North Dakota," he says.

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High-Value Crops

Five hundred acres of mint and more than 300 acres of onions in North Dakota doesn't sound like much, but there are great possibilities for high-value crops in the state, according to two NDSU Extension Service value-added agriculture area specialists. "I see a lot of potential, and there are some new things happening," says Rudy Radke, based in Fargo.

Chet Hill, working at NDSU's Williston Research Extension Center, agrees. "It's exciting working with producers on new projects and then watching them grow."

Hill also says local growers need long-term contracts for barley and alfalfa production, which would make it easier to develop irrigation infrastructure.

Hill and Radke are working with wineries in Casselton and Burlington. Wineries are assembling alliances for fruit production and delivery, and have had good experiences this year with incoming fruit and a labor force. NDSU has also received a grant for research plots to study various varieties of grapes, junberries, chokecherries and other fruits.

NDSU research is not just focused on new crops, according to Hill. "We have to look at the markets in order to make it work for the producer. Marketing strategies are a big component."

Hill and Radke are also working with onion growers. The research extension center in Williston, in collaboration with a Montana State University research center in Sidney, Mont., had two plots devoted to onions.

"One of our main goals is to increase onion yields," Hill says. "Our current yield is 10 to 20 tons per acre, but we think 30 tons per acre is very attainable. We're working on water and weed management to increase yields."

Hill and Radke have also worked with other diverse operations such as horticulture tree and shrub production, pumpkin production, hydroponics greenhouse, seed potato, carrot and cabbage producers, and entertainment/educational agriculture farms.

Hill is working with producers and companies that are building an ethanol and an alfalfa plant near Williston. "We need to make sure that enough corn and alfalfa is raised in the region to support the plants," Hill says.

Radke is also working with a group looking to build an ethanol plant and was invited to become a board member of a group wanting to build a biodiesel fuel operation.

Will grape or pumpkin acreage grow to rival wheat or soybeans? "If you look back at the history of North Dakota agriculture in terms of specialty crops like sugarbeets, potatoes, sunflowers or edible beans, anything is possible," Radke says.

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Youthful Eyes on the River



Youth across the Red River Basin are providing a flood of information to water resource managers and are awash in learning experiences.

The Red River Basin Institute's Watershed Education Center, in partnership with Northwest Minnesota RiverWatch and Oak Hammock Marsh Interpretive Center, is organizing teams of students that will monitor surface water quality and conduct watershed-related research, education and service projects. There are RiverWatch teams in Minnesota, North Dakota and Manitoba involved in the cooperative multi-state international project.

"The effort gives students a sense of place and a connection to the local watershed," says Joe Courneya, an NDSU Extension Service 4-H youth specialist and director of the center. "It also gives them a chance to participate in real-world science."

The center and its partners purchased hand-held, computerized water quality testing equipment, turbidity meters and other equipment for students to use to perform water quality testing that meets U.S. Environmental Protection Agency standards. The information they gather is shared with water resource managers who use the data to get a better picture of ecosystem health and changes in the watershed.

Students and teachers are being encouraged to develop proposals for research that could be conducted in concert with faculty at colleges in the region. In addition, more than 100 watershed-related lessons have been developed by teachers who participated in the center's Red River and You Institute. This year's institute was held in Walhalla.

Some of the RiverWatch teams have taken the process a step further, participating in the "Adopt-A-River" program to canoe and clean a stretch of river.

Courneya says the activities will help prepare students for their future careers. "We're using the same technology in our programs as professionals use. The students also must develop their thinking skills and their ability to gather, interpret and present data. They are also developing personal qualities like a work ethic, integrity and a sense of responsibility. Finally, they are honing their interpersonal skills. They have to work as a member of a team, teach skills to others and serve as leaders," he says.

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NDSU to Dedicate New Horticulture Demonstration and Research Garden

NDSU dedicated a new Horticulture Demonstration and Research Garden during homecoming week in October.

The garden is located at the corner of 12th Ave. North and 18th Street on the main campus. The new garden is located near the existing garden, but the new site will provide more space and improved visibility, says Ron Smith, NDSU Extension Service horticulturist and turfgrass specialist.

"The expanded range of plants and resources at the new garden will significantly enhance our teaching and research programs as well as our extension and community outreach programs," Smith says. "Gardeners and landscapers continue to become more sophisticated and demanding. This garden will be an educational resource for professionals, students and gardeners. Our strength will be the ability to address garden and landscape challenges that are unique to our region."

The expanded garden will include hundreds of plants, Smith says. In addition, the site has dedicated parking for visitors, permanent labeling for all perennials and a building that will be used for teaching. The garden will include herbs, vegetables, small fruits, woody plants and turfgrass trials. "The garden will cover 3 to 4 acres when it is complete, which will be years from now," Smith says. "This is something that we'll grow into."

Two highlights of the new garden will be a collection of day-lilies, possibly the largest collection of daylilies at any land-grant university, and a collection of irises, donated by the family of Art Jensen.

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Malt Blends to Now Include Drummond

Anheuser-Busch Inc. and the Miller Brewing Company will now include NDSU's Drummond barley in their malt blends for brewing. Anheuser-Busch has completed its plant-scale evaluation of the six-row barley variety and found it satisfactory. Miller Brewing completed similar tests earlier.

NDSU six-row barley breeder Richard Horsley developed Drummond. It was released in 2000 through the North Dakota Agricultural Experiment Station at NDSU.

Drummond is named in honor of Bill Drummond, the first executive director of the North Dakota Barley Council. During his career, Drummond also worked as an agronomist for the Malting Barley Improvement Association and as an agent for the NDSU Extension Service.

Drummond has a greater yield potential than Robust but is similar in heading date and plant height. Robust has been the top planted barley variety 18 out of the last 19 years. In statewide trials, Drummond has outperformed Robust, on average, by more than 2 bushels per acre, Horsley says. "The economic impact of planting Drummond, especially for malting, could be substantial for barley growers."

Drummond has a greater degree of straw strength than any commercially available six-rowed variety. It is resistant to spot blotch and is similar to Robust in its resistance to Fusarium head blight (scab).

North Dakota continues to rank first in barley planted acreage in the United States, with 38.5 percent of the nation's total. Planted acres in North Dakota were 2.1 million in 2003, up from 1.6 million in 2002.

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Thousands Visit Research Extension Centers

NDSU's research extension centers hosted about 5,000 people for tours, field days and other events during the 2003 growing season. The centers are where local problems and opportunities are explored, and they give researchers a chance to test new management techniques, crops and crop varieties under various conditions. They're also places where producers, consultants, researchers and others come to learn what's new, what works and what doesn't.

The centers host training sessions on topics ranging from crop pests to cattle feeding. Each of the centers holds at least one major field day during the season. Here are some highlights from 2003.

- The Carrington Research Extension Center's research trials and demonstration plots were used by NDSU faculty and staff for formal field training for nearly 800 people. The center hosted international visitors from Argentina, Belarus, Canada, Georgia and the Netherlands.
- The Central Grasslands Research Extension Center near Streeter featured information on how ranchers can increase their forage production during drought. The annual field day drew about 130 people.
- The Dickinson Research Extension Center hosted 1,400 guests at its annual summer field day. A horse field day drew nearly 200 horse breeders, trainers and leisure riders. Topics included care and management of horses and prevention of West Nile virus.
- The Hettinger Research Extension Center hosted two station tours and four off-station tours. A tour near Selfridge was a cooperative effort between NDSU and South Dakota State University. About 400 people attended the tours. A highlight was an alternative crop tour at Hettinger that included research on mustard, proso millet, chickpea, canola and Niger seed production.
- The Langdon Research Extension Center showed off its new learning facility that was under construction. The center hosted 15 field, crop and research tours during the growing season with about 1,000 people attending.
- The North Central Research Extension Center in Minot hosted more than 400 people at its first Ag Neighbors Day, an event designed to combine the center's annual field day with an event to show appreciation to the military stationed at the Minot Air Force Base. The center also hosted a pulse crop tour and a sunflower, corn and soybean day, which each drew about 100 people.

- The Williston Research Extension Center hosted the largest crowd in about 15 years at its annual field day — about 300 people. At the event, producers predicted the yield of one wheat and two barley varieties at the center. Those with the best guess will win 10 bushels of seed. Nearly 800 attended the traditional chicken barbeque sponsored by area businesses. An annual tour for area business leaders drew about 60 people.
- The Agronomy Seed Farm near Casselton hosted its annual tour to highlight variety trials and weed control research. About 100 attended.

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Turfgrass Management Program Starts Strong

Twenty-three students are enrolled in the first year of the Sports and Urban Turfgrass Management program at NDSU, according to Deying Li, program coordinator. "Experts feel there will be strong, continued growth in the industry, especially here in North Dakota because the industry is not well-developed."

The Department of Plant Sciences offers the four-year program. Students can specialize in fields such as maintaining a sports complex, managing a golf course, developing equipment, consulting, establishing a business in the industry, sod farming, chemical and equipment sales, irrigation design and sport facility architecture. "Some students will take business courses because they want to start their own company," Li says. "Others may take soil or plant protection related courses because they want to manage turfgrasses."

Li also sees the potential for the program to change the dynamics of the state's economy. "On average, a typical sod farmer will sell his product in a 75-mile radius. Other than a couple of hobby sod farms, there are currently no sod farmers in the state. Some landscapers must haul sod 300 to 400 miles. It's an opportunity for a producer to diversify or someone to enter the turfgrass business."

Research will also be a big part of the new program. "With research you have to look at the positive effect on the students," Li says. "Research gives students the opportunity for hands-on training as well as classroom work." There are some research plots currently dedicated to turfgrass studies, but Li is hoping to expand those plots. The program has received a joint USDA-United States Golf Association grant for a national turfgrass cultivar evaluation program. The USGA also is sponsoring research on putting green construction.

On a more local level, Li is working on research with some small-scale sod farmers and golf course superintendents.

The new program is located in Loftsgard Hall on the NDSU campus. It includes classrooms, research labs and student learning centers. Other facilities include a newly constructed greenhouse to be used for turfgrass research and teaching. Research plots are located on campus and at NDSU research extension centers in Dickinson and Williston.

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Bringing the Latest Technology to Rural Communities

Construction on the Vic Sturlaugson Learning Center at NDSU's Langdon Research Extension Center is complete. The new facility will allow the center to become more engaged in addressing problems facing producers and rural communities in northeastern North Dakota, according to Director Randy Mehlhoff.

"In addition to featuring our agricultural research projects, the new facility will serve as a hub for rural community economic development, workforce training, long-distance education and community development," Mehlhoff says.

The main features of the building include a large meeting room for producer educational gatherings and extension-based workshops, a computer classroom to offer long-distance education classes and workforce training, and new office headquarters for existing staff at the Langdon Research Extension Center.

The facility is named after past Center Director Vic Sturlaugson. Sturlaugson was director for 44 years, from 1925-1969. "Vic was personally dedicated to providing research and outreach to the farmers in this region for many years," says Mehlhoff, "and this facility is in recognition of him and his family."

The idea to create a learning center was initiated five years ago when the Cavalier County Job Development Authority conducted a survey to gauge what local citizens felt were the most important needs in rural North Dakota. Feedback indicated a strong desire for some type of facility that would bring the latest technology to the area and help rural communities cope with issues.

Fundraising for the project began in 2000 when Mehlhoff became director. A \$300,000 appropriation was designated for the facility during the 2001 legislative session, but the remaining portion of the million-dollar project will be raised locally.

Mehlhoff hopes to work with North Dakota State University, Lake Region State College, Valley City State University, University of Mary and possibly others to offer college courses through the Web and videoconferencing by the 2004 spring semester.

Mehlhoff is also excited about their partnership with Lake Region State College (LRSC) in hiring an adult farm business management instructor. The instructor will be an LRSC faculty member but stationed in the NDSU learning center. Duties will include meeting with farm families and managers to enhance marketing and financial record-keeping skills. Mehlhoff notes that this is just one example of how developing partnerships has advanced the project.

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Scouting Fields for Pests

It was another busy season for scouts involved in the NDSU Integrated Pest Management (IPM) program. Throughout the growing season, scouts survey fields weekly monitoring for major pest problems in wheat, barley, canola, soybean, sunflower and flax.

"From the information they gather, we track pest development and provide weekly updates and maps on pest distribution," says Marcia McMullen, NDSU Extension Service plant pathologist and coordinator of the IPM project. "Producers can then make timely decisions regarding the need for pest control. One of the primary missions of IPM is to help growers produce profitable crops using environmentally and economically sound approaches."

Scouts monitor for problems such as grasshoppers, canola flea beetle, sunflower beetle, tan spot of wheat, Fusarium head blight in wheat and barley, wheat and barley leaf rust, barley net blotch, soybean aphid, Pasm on flax, plus other diseases and insects.

The information from field scouting helps extension personnel, consultants and growers determine the need for pest control. "The pest population or economic threshold plays an important role in IPM decisions," McMullen says.

IPM strategy involves several approaches to managing pests, such as biological, cultural, physical or chemical controls. "As researchers develop economic thresholds and disease forecasting, IPM practitioners have helped North Dakota growers reduce unnecessary pesticide use," McMullen says.

In 1996, for example, 2 million acres of wheat were at high risk to wheat midge damage based on past population history and the high number of overwintering midge cocoons. However, only 40 percent of the acreage was treated because of extensive field monitoring and proper use of economic thresholds during the growing season. More recently, disease survey data along with small grain disease forecasting models available on the Web have indicated the need for fungicide use in wheat.

To learn more about the IPM program, contact your county office of the NDSU Extension Service or visit the IPM Web site at www.ag.ndsu.nodak.edu/aginfo/ndipm/index.htm

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Bull Market for Marketing Info

A bull market for cattle is rustling up increased interest in improved marketing strategies across the region. To meet that interest, NDSU Extension Service specialists have held dozens of outlook sessions.

"We've covered the two major questions: How much higher will prices go? and How long will they last?" says NDSU Extension Service Livestock Economist Tim Petry. He and other NDSU livestock and marketing specialists held a cattle price outlook session that was downlinked by interactive video to 11 sites across the state. Specialists also presented to marketing clubs, producer

groups, the North Dakota Bankers Association's Agricultural Credit Conference and at other events.

Petry says the increases in cattle prices are weather related. "We're going on three-plus years of drought in cattle-producing regions of the United States, and that will have ramifications for the next several years," he says. "When herd rebuilding begins, heifers will be held off the market, and that will cut supply and increase prices even more."

"The biggest dilemma," Petry says, "is when will it rain?"

In addition to prices and marketing, specialists have addressed the country of origin labeling (COOL) as well as the outbreak of bovine spongiform encephalopathy in Canada. "Our goal is to educate our producers so they can make better decisions," he says.

Another focus of Petry's efforts has been the introduction of a Web-based marketing game into marketing clubs. "For now the game focuses on crops only, but later we'll develop one for live-stock," he says. "The game allows producers to understand futures and options without having to invest.

"You can talk about futures and options and read textbooks, but until you do it and face a margin call, pay the brokerage fees and lose some money, you don't really learn it," he says.

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Alsen's Impact Continues to Grow

The number of hard red spring wheat acres planted to the variety Alsen continues to grow. It accounted for 37.4 percent of the spring wheat acres this year, an increase of 6.6 percent over last year. More than 2.25 million acres were planted to Alsen in North Dakota this year.

Alsen was released in 2000 and is the result of a three-way cross made by Richard Frohberg, who at that time was NDSU's hard red spring wheat breeder. Frohberg is now a professor emeritus at NDSU.

Alsen, in field trials conducted across the state at NDSU research extension centers, has demonstrated a level of resistance to Fusarium head blight (scab) better than virtually all commercial varieties currently available.

Scab has cost producers hundreds of millions of dollars in reduced yields and crop quality. Work on scab resistant wheat varieties began in the mid-1980s after NDSU plant pathologists Robert Stack and Marcia McMullen observed scab symptoms in commercial fields while conducting root rot surveys.

Alsen also displays resistance to other diseases such as wheat stem and leaf rust. It is a semi-dwarf height wheat that has strong straw strength, a medium-early maturity rate and average-to-good baking and milling qualities.

Research continues at NDSU to produce varieties of hard red spring wheat that have improved resistance to scab and improving yield and quality. Currently, 68 percent of all hard red spring wheat grown in North Dakota is from varieties developed by NDSU.

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Dairy Industry Takes Stock



North Dakota dairy producers want to assure that the state will have a dairy industry in decades to come.

"Producers are looking at where we'll be as a dairy industry in 2020. They're developing a vision and determining how we get there from here," explains J.W. Schroeder, dairy specialist with the NDSU Extension Service who is working with producers.

In late 2002, a statewide dairy task force was revitalized with greater input from dairy producers. For the last decade, the dairy industry in North Dakota has lost producers at a rate of 3 to 15 percent annually. "Generally, those losses are from age and attrition," Schroeder says. "We've gotten to the point where the infrastructure for our dairy industry is at risk."

A key to the future, the task force determined, is growth in North Dakota's dairy industry. That growth may come from expansion of existing dairies, but likely will also require investment from outside the dairy industry and from outside the state.

During the summer, Schroeder and members of the task force attended a series of farmyard socials across the state to share the vision for an expanded dairy industry. The goal was to enlist support from the broader dairy industry and to gather ideas for strengthening the industry.

He notes that most dairy expansion in the last decade has occurred in heavily populated areas of the country. "The industry is realizing that will need to stop.

"We want future expansion to occur here," Schroeder says. "This can be a real source of rural development for us. Research shows that nowhere is there so much of a return to the community as in dairying. The key will be to put in place resources that will allow the industry to do what it needs and wants to do here."

The North Dakota Department of Agriculture and the North Dakota Association of Rural Electric Cooperatives are also assisting with the group's efforts. The strategic plan and vision is built on earlier efforts by the dairy industry to improve production and increase the number of producers. A major component of those efforts was the North Dakota Dairy Diagnostic Program administered by the NDSU Extension Service. That program continues to help producers identify key areas for improvement.

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