

*Committed to
Excellence*

2005 Annual Highlights
North Dakota Agricultural Experiment Station
NDSU Extension Service

NDSU
North Dakota State University



D.C. Coston
Vice President for Agriculture
and University Extension

What a privilege it is for Debbie and me to become part of the North Dakota State University family. Many people have warmly and graciously welcomed us to North Dakota and this outstanding institution.

As I was learning about NDSU in preparation for my interview, I was continually impressed by the heritage and history of the university and with the exciting recent accomplishments. Since coming to North Dakota in early June, my understandings and admiration have grown.

During the summer, I attended the field days at all of our Research Extension Centers and have visited several of our county Extension offices. I have gotten to know numerous leaders in agricultural industries, in local and state government, in our federal delegation offices and in numerous communities across the state. I have used the early weeks of the fall semester to visit individually with most of our faculty in their offices.

Two messages are clear from these many conversations: (1) The citizens of North Dakota have great expectations and confidence that NDSU can make a significant difference in the future of the state, and (2) Our faculty, staff and administration continue to find innovative ways to deliver on these expectations.

// There is a commitment to excellence here that is second to none. //

Land-grant universities were founded to assist in the economic and social growth of the United States. These institutions, including NDSU, have met this mission incredibly well throughout their histories. It is no surprise to anyone that today there are significant challenges in North Dakota's rural communities.

Citizens across our state express the hope that their communities can be vibrant and successful in the years to come and that their children and grandchildren can live fulfilling, happy lives in these same areas. This is a monumental challenge to which we must give our best. Our efforts must find new and expanded economic opportunities; must develop understandings of the infrastructure needs essential to the future of rural areas; and must help citizens, businesses and community leaders evaluate what can be done to implement successful strategies.

This publication provides a small cross-section of the myriad creative ways that our faculty, staff, students and administration address issues that are critical to the citizens of North Dakota. Because of the state's population, NDSU will never be as large as many of our sister land-grant universities. Yet there is a commitment to excellence here that is second to none. The accomplishments of NDSU have established a reputation for getting things done. State, federal and industry partners know that an investment in our efforts will yield a great dividend.

We shall build on NDSU's reputation and commitment for even greater levels of accomplishment in the years to come. Much of this will be done through interdisciplinary efforts that bring together accomplished faculty and staff from a number of backgrounds. Through such endeavors, we will find new solutions and opportunities that will be of great benefit to our fellow citizens of North Dakota, that support our faculty and staff in reaching their personal and professional goals, and that enhance the reputation of North Dakota State University.

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North Dakota Can be Major Player in the Growing Biodiesel Industry

North Dakota is in an excellent position to provide a renewable fuel source for diesel engines that is efficient, economical to produce and easy on the environment, NDSU experts believe.

An alternate fuel supply also might stabilize soaring diesel prices, they say.

That source is biodiesel made from the state's major oil-producing crops – soybeans, canola and sunflowers.

"Biodiesel will mix in any proportion with diesel and will work in any diesel engine," says Vern Hofman, an NDSU Extension Service agricultural engineer.

Combined, this year's soybean, canola and sunflower crops have the potential to produce more than 300 million gallons of biodiesel. The state's agricultural industry uses about 96 million gallons of diesel a year.

Every gallon of vegetable oil will produce about 1 gallon of biodiesel. It provides 3.3 British thermal units (Btus) of energy for every Btu used in growing the crop and processing the oil. Studies show that biodiesel also creates less air pollution than other fuels.

About a year ago, NDSU experts began a project to demonstrate that biodiesel made from canola oil works well in unmodified diesel engines. Rapeseed oil, which is very similar to canola, is used extensively in Europe

as a diesel fuel extender, but canola isn't used in the U.S. However, several U.S. and Canadian biodiesel manufacturing plants are interested in using canola, Hofman says.

Soybean-based biodiesel has been available commercially in the U.S. for several years.

The Archer Daniels Midland plant in Enderlin provided about 300

gallons of canola oil for the demonstration project. NDSU Department of Agricultural and Biosystems Engineering staff converted it to biodiesel.

This summer, NDSU's North Central Research Extension Center at Minot used the canola-based biodiesel to operate three tractors. Two ran on a mixture of 20 percent biodiesel and 80 percent diesel. The other ran on 100 percent canola oil-based biodiesel. The biodiesel didn't alter the tractors' power or performance, according to Jay Fisher, center director.

"We're anxious to try some this winter to see how it flows," he says.

One of biodiesel's drawbacks is its tendency to gel at below-freezing temperatures. Hofman says canola oil-based biodiesel has an advantage over soybean biodiesel because the canola product gels at a lower temperature, which means it will work better in cooler weather.

Fisher says NDSU research efforts such as the demonstration project will help work around such problems.

Other recent NDSU energy-related research includes:

- The North Dakota Agricultural Experiment Station released Rawson, a two-rowed barley variety that has a high level of starch, making it a possible candidate for ethanol production.
- NDSU's Central Grasslands Research Extension Center at Streeter is involved in a U.S. Department of Agriculture study of the potential for using switchgrass as a commercial biomass energy crop. Efforts are under way to fund similar research on grasses at six other Research Extension Centers.
- The Department of Mechanical Engineering tested commercially available biodiesel in equipment at the Fargo landfill.

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Studies show that biodiesel creates less air pollution than other fuels.



A gallon of oil from crops such as canola will produce about a gallon of biodiesel.



▲ Peter Polansky, an NDSU junior from Gatzke, Minn., majoring in agricultural and biosystems engineering, pours crude biodiesel into a container, where a byproduct called glycerin will settle to the bottom.

Kristi Tostenson, research specialist at the NDSU Pilot Plant, demonstrates the conversion process on a larger scale.



Series above: These are some steps in the lab level in converting canola oil to biodiesel.

ProSoy and Pembina are Newest Soybean Varieties

ProSoy and Pembina are the latest soybean varieties developed and released by the North Dakota Agricultural Experiment Station.

ProSoy is a conventional, nongenetically modified tofu-type soybean. ProSoy has about a 10 percent yield advantage over Proto and almost a 16 percent yield advantage over Norpro, which are other tofu-type soybeans being grown, according to Ted Helms, leader of the NDSU soybean-breeding project.

NDSU tests indicate ProSoy produces an excellent tofu product. It produces a good tofu yield and has good sensory characteristics. It is typically high in protein and has a yellow hilum, both desirable characteristics for the tofu market.

Pembina is also a conventional, nongenetically modified soybean variety. Pembina is expected to replace acreage of Jim, an early maturing variety also developed by NDSU.

A big advantage of Pembina is that it contains the Rps4 phytophthora root rot gene that confers resistance to races 1 through 4, according to Berlin Nelson, NDSU soybean pathologist.

The North Dakota Soybean Council provided some of the funding for the development of ProSoy and Pembina.

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Geospatial Technology Advances Aid Producers

Producers are increasing their use of geospatial technology in machinery operation and farm management, according to John Nowatzki, NDSU Extension Service geospatial specialist.

“Producers using these technologies are able to apply crop inputs faster and more accurately with less overlaps or misses, allowing fertilizer and chemical applications where they are most needed,” Nowatzki says.

Tractor and machinery guidance systems are the most common geospatial technologies used on farms today. Yield monitors on harvesting equipment, particularly combines, are being used more frequently, too. Some farmers use GPS-equipped variable-rate fertilizer and chemical application equipment

to apply different amounts of crop inputs at various locations across fields, which is based on projected crop needs for those locations. Producers also use GPS to mark field boundaries and unique or problem areas in fields, such as weed patches or large rocks.

Remote sensing is another geospatial technology increasingly used by farmers. Remotely sensed images from satellites or aircraft can be used to identify nutrient deficiencies, diseases, water deficiencies or surpluses, weed infestations, insect or herbicide damage, and crop populations.

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The Nose Knows, As Does the Ear Tag

Computer-based information technologies and intelligent sensor technologies have tremendous potential for the evaluation of agricultural crops, livestock and food products, according to an NDSU professor.

Suranjan Panigrahi, professor in the Department of Agricultural and Biosystems Engineering, is investigating the applicability of electronic nose technologies for predicting the safety of meat and grain products.

A long-term goal is to develop miniaturized portable sensors that can provide high-quality information to users about specific food and agricultural products.

Volatile chemicals/gases are generated because of the fungal and bacterial metabolism of food products. They can be used as a food quality indicator to alert the public to food product safety concerns. Electronic noses or odor sensors can be developed and adapted for this purpose.

Because meat and grain are important segments of the U.S. agriculture and food industry, the research will focus on these food products.



Workers attach a radio frequency identification ear tag.

Meanwhile, research continues at NDSU and the Dickinson Research Extension Center on radio frequency identification tags to track cattle. The tags could help producers and others in the industry monitor herd performance. Should a cattle disease outbreak occur, the tags could be used to show where a particular animal has been since birth.

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Extension staff take advantage of a five-hour bus ride to discuss production issues with producers and others going to visit a research farm in South Dakota.

NDSU Continues to Seek Ways to Aid Agricultural Producers

NDSU continues to find different ways to help North Dakota's agricultural producers do their job better.

Here are some of the methods Research Extension Center staff and Extension Service specialists and agents are using to demonstrate the newest production techniques and technologies and help producers solve problems.

- Self-guided tours of crops that show how a producer has managed a particular problem
- Development of a producer network in which producers call each other for advice on one-pass seeding
- Field tours and livestock programs at the Research Extension Centers
- Developing disease-resistant, better yielding crop varieties; breeding livestock with more desirable characteristics; and studying how livestock producers can take advantage of the crops grown in North Dakota
- Regular meetings of Extension agents and state livestock and cropping specialists to discuss specific concerns, such as drought or excessive rainfall
- Weekly crop teleconferences with Extension agents and specialists and Research Extension Center staff to discuss issues such as insect, disease and weed problems; fertilizer issues; and growing conditions
- Using videoconferencing to hold workshops in multiple locations simultaneously
- The North Dakota Agricultural Weather Network Web site provides the latest weather data and models producers can use to estimate crop growth, forecast disease development and calculate crop water use
- Publications, news releases, newspaper columns and radio programs to alert producers about potential problems and how to deal with them

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Pulse Crop Popularity Continues to Expand

North Dakota is the nation's No. 1 producer of field peas for the fifth year in a row.

The state also is the No. 2 producer of lentils. Field peas and lentils, along with chickpeas, are known as cool-season pulse crops. Pulse crops produce edible seeds from annual legumes. "Pulse" comes from a Latin word for a thick soup.

Blaine Schatz, director of NDSU's Carrington Research Extension Center, believes a number of factors are responsible for the expansion in pulse crop production in North Dakota. They include:

- North Dakota producers' historically positive attitude toward trying new cropping opportunities
- Efforts of the North Dakota Dry Pea and Lentil Association, the industry producer group, to support research and expand domestic and foreign markets for these crops
- The work of NDSU researchers and Extension specialists to respond to pulse crop producers' management and production concerns with the newest research-based information. Those efforts include establishing the annual MonDak Pulse Day at the Williston Research Extension Center, organizing crop tours, answering questions and providing advice.

NDSU research has shown that pulse crops are good in rotation with cereal grain crops because they create a break in disease cycles and have the ability to obtain their own nitrogen. Research also shows that field peas are a beneficial source of protein and energy in all phases of beef cattle feeding. Other NDSU research efforts have resulted in new pulse crop varieties and improved practices to control weeds in those crops.

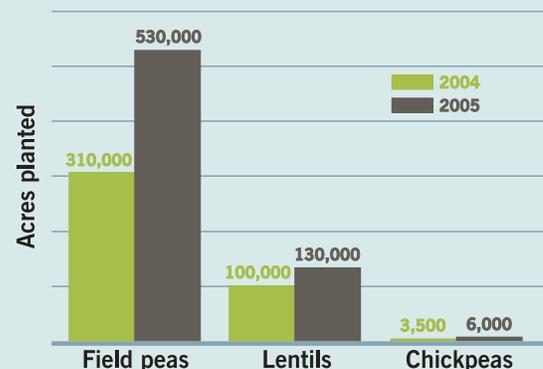
Schatz says the same factors that have increased pulse crop production also have spurred growth in the state's pulse crop processing industry.

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North Dakota Pulse Crop Growth





Faculty and researchers in the Department of Veterinary and Microbiological Sciences maintain a focus on the pathogenesis of infectious disease, with programs in bacteriology, immunology, virology, epidemiology and food microbiology.

NDSU Uses Microbiology to Study Mice and Men

Few people realize what goes on in the microbiological world and even less about how it can affect their day-to-day lives. Researchers in the Department of Veterinary and Microbiological Sciences (VMS) at NDSU peer daily into this very small world to find answers to problems that may save your life.

Department head Doug Freeman explains, "While many people think VMS works only on disease research in animals, it is important to realize that diseases that affect animals can be problems for humans as well. The research carried out on West Nile virus in horses is a good example."

Horses are infected by the disease in the same way as humans. NDSU researchers are evaluating the effectiveness of a vaccine for horses and have found it can improve a horse's chance of survival. A predictive model has been developed to assess whether a horse with the virus will recover, and this can help veterinarians give advice to owners.

"This type of research on horses has the ability to be applied to a human model and has an important community health function," added Freeman.

Jane Schuh, an assistant professor, is studying the effects of asthma on mice. Her research focuses on understanding the origin and maintenance of asthma and the body's immune response to it, which then can be adapted and applied to humans.

About 17 million Americans have asthma, and 6.3 million of them are children. Treating the disease costs \$14 billion per year.

Asthma can cause permanent damage to airways over time. This doesn't mean everyone who suffers from asthma will develop problems, but there is a chance.

Using a live mouse model, Schuh quickly can see the effects of the disease. Symptoms and results occur in mice within weeks, while in humans this can take decades.



"Using an animal model of a human disease helps us to see the problems earlier, and it is the first step in developing treatment strategies that can be applied to clinical asthma faster," Schuh said. "This saves time, discomfort and money in the long run."

"We used to think that kids 'grew out of' their asthma," Schuh explained, "but that doesn't seem to be the case. What does occur is that people learn to avoid the triggers that elicit their asthma attacks and modify their lifestyles, so that as they get older, the effects don't appear as severe."

What is causing concern is that the growing demographic for asthma is adolescents.

"The big thing to remember is that it is really important for kids to keep their asthma under control by using their asthma medicine regularly, not just when they have a flareup," said Schuh.

"Parents don't need to be scared," Schuh continued, "but they do need to make sure their children understand the importance of keeping up with their medication and help them to understand their particular reactions to asthma. There can be long-term implications, but they are manageable with an asthma action plan that can be developed with their family doctor."

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// It is important to realize that diseases that affect animals can be problems for humans as well. //

New NDSU Hard Red Spring Wheat Has Good Resistance to Scab

Glenn, a new hard red spring wheat variety, has a higher level of scab resistance than Alsen or Steele-ND, according to Mohamed Mergoum, leader of the NDSU hard red spring wheat breeding program. Glenn was developed and released by the North Dakota Agricultural Experiment Station.

Fusarium head blight, or scab, was again a major economic problem for North Dakota producers in 2005. Total losses due to scab in hard red spring wheat, durum and barley are estimated at more than \$162 million, according to William Nganje, NDSU agricultural economist.

"For every \$1 of scab losses incurred by the producer, \$2.08 in losses are incurred in other areas of rural and state economies," Nganje says. "This implies that direct and secondary losses to North Dakota can be estimated at \$4.49 billion from 1993 through 2005."

Glenn combines two sources of genetic resistance to scab. Steele-ND, released by NDSU in 2004, has scab resistance from a wild wheat, while the resistance in Alsen, also an NDSU release, is from a Chinese spring wheat.

Another advantage of Glenn is its good milling and baking properties, according to Truman Olson, NDSU cereal scientist. Glenn also exhibits the traditional strong dough-mixing characteristics that are needed when used as a blending wheat.

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Manure is a Valuable Resource as Crop Fertilizer



Staff apply beef feedlot manure at the Carrington Research Extension Center.

"With an average of 10 to 15 pounds of nitrogen available per ton in the first year of application of beef feedlot manure, its value is once again starting to be recognized."

Compared to anhydrous ammonia at about 24 cents per pound of actual nitrogen or urea at about 35 cents per pound of actual nitrogen, beef feedlot manure at 12 cents per pound of available nitrogen is a clear bargain (custom hauled with 12 pounds of available nitrogen per ton).

"At half the price of commercial nitrogen fertilizer, utilizing livestock manure is a smart business move," Wiederholt says. "If the cost of applying manure is spread out over the amount of phosphorus and potassium contained in manure, then the cost of the nitrogen is even less."

To realize the value of manure, it has to be applied uniformly and consistently similar to commercial applications.

"If there is hesitation to believe the value of manure as a soil amendment, producers can be assured that significant amounts of research have been done on the value of manure nutrients and its impact on soil quality," Wiederholt says. "Some producers are concerned, though, that most of this research has been done in states surrounding North Dakota. To address this concern, there is ongoing research being conducted at the NDSU Carrington Research Extension Center to verify manure's nutrient value under our soil and growing conditions. Results and information from that research will become available as the trials conclude."

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If the high prices of commercial nitrogen fertilizer are putting pressure on crop production budgets, then livestock manure may be a substitute, according to an NDSU nutrient management specialist.

"Livestock manure has for too long been regarded as a waste product," says Ron Wiederholt, Extension nutrient management specialist at the NDSU Carrington Research Extension Center.

NDSU Faculty Receive Second Sugar Sensor Patent

Two Agricultural and Biosystems Engineering faculty have received a second patent on the sugar sensor they invented.

Suranjan Panigrahi, a professor, and Vern Hofman, an associate professor and Extension agricultural engineer, created the sensor. Growers can use it in the field to determine the sugar content in sugar beets almost instantaneously.

The first patent was for the sensor's hardware component. The second was for the software component.

Panigrahi and Hofman say their next step is to make the sensor smaller so it can be integrated with harvesting equipment. That will allow producers to check sugar content while they're harvesting.



Vern Hofman, left, and Suranjan Panigrahi demonstrate how their sugar sensor works.

The inventors say their sensing technology also could be used in precision farming and biological and biomedical sensing applications.

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N.D. Farm Family Living Expenses Increased \$2,587 in 2004

Farm families spent an average \$43,104 for living expenses in 2004. That number is from 289 farm families who are enrolled in the North Dakota Farm Business Management Education Program and kept detailed living expense records throughout the year.

The average does not include income taxes or self-employment taxes, says Andrew Swenson, NDSU Extension Service farm management specialist. The number is from an average household size of 3.4 people.

The largest expenditure was medical care and health insurance at \$7,291. In the 1990s, food was the largest expense. Food now is third at \$6,307. The second largest expense is shelter, supplies and furnishings at \$6,808.

The fourth largest expense category, personal purchases and recreation, had the largest increase, going from \$5,354 in 2003 to \$6,124 in 2004. Another large expense is vehicle operation and purchase for the household, not farm business purposes. It was \$5,024.

Some smaller expense items had large relative increases in 2004. Education increased from \$1,118 in 2003 to \$1,423 in 2004, and personal insurance (life, disability and long-term care) increased from \$1,384 to \$1,544.

The North Dakota farm family living expenditure numbers compare favorably with national averages.

"Seeing the numbers, in black and white, solves the mystery of where the money is going and provides a benchmark to manage expenditures in the future," Swenson says. "If a young household could cut expenses by 5 percent, it would save \$2,000 per year on average. Saving \$2,000 a year and investing either in or out of the farm at a 5 percent annual return after taxes would increase net worth by more than \$250,000 in 40 years."

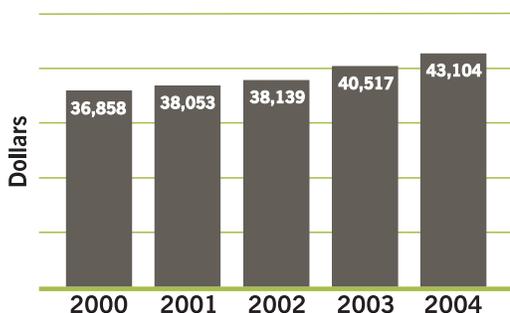
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North Dakota Farm Family Living Expenses



Producers learn more about no-till during a tour near Hazelton in Emmons County.

Energy Costs Spur No-till Interest

Interest in no-till cropping management continues to grow in North Dakota. A major contributing factor is the dramatic increase in energy costs. To meet the need for more information, NDSU Research Extension Center and Extension Service staff continue to hold workshops, tours and field demonstrations on no-till cropping. RECs across the state also conduct crop production trials using direct-seeding or no-till systems.

"The move from tillage to no-till is a change in tradition and crop management systems," says Greg Endres, NDSU Extension Service area agronomist. "In other words, no-till is a change in culture as well as the more obvious changes in tillage and equipment needs."

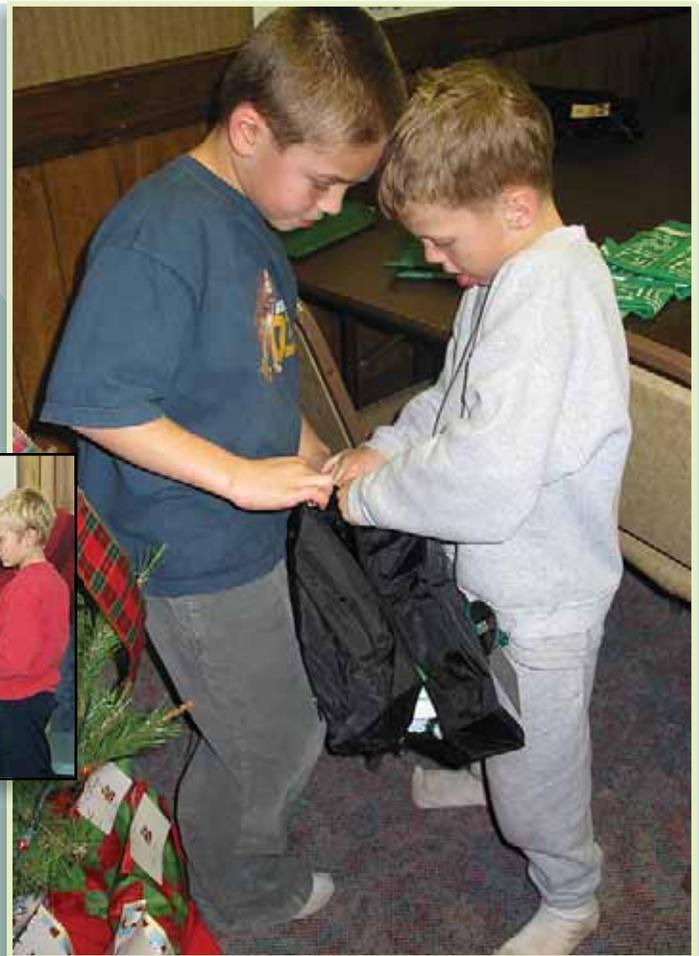
Endres says research and farmer experience indicate that no-till cropping has many benefits, but also has some challenges.

- General no-till benefits include reduction in some crop input costs, including fuel, equipment and labor; sustained or improved long-term crop yield; soil and soil moisture conservation; and improved soil quality/productivity.
- Challenges include crop residue management; the need for more diverse and intensive crop rotations; crop establishment issues such as planting equipment selection and use; changing traditional soil water management; fertilizer application; and changes in weed and disease management.
- No-till also provides benefits and challenges for agribusinesses, such as crop input suppliers. Examples include an increase in pesticide sales due to increasing cropped acres, but a decrease in fuel and tillage equipment sales. Field scouting and crop consulting needs increase, and business capital increases to supply a large quantity of crop inputs over large acreage during a short crop production period.
- Examples of soil biota benefits that are enhanced with no-till include residue decomposition that retains and cycles nutrients, improved soil water retention and infiltration, a breakdown of residual pesticides, and an increase in soil aggregation and organic matter.
- No-till helps maintain or increase soil carbon content, compared with intensive tillage, which enhances soil carbon loss.
- No-till increases the challenge of efficiently providing nitrogen and other nutrients for crops, since tillage to incorporate nutrients is not an option.

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4-H club members write letters of support and fill backpacks with items to help children stay connected to family members deployed on military duty.

Extension Service Reaches Out to Military Families

Like many North Dakota teens, Katie Finken knows at least one family with someone who has been deployed on military service.

So the high school sophomore who lives near Douglas was glad her 4-H club decided to participate in the 4-H Hero Pack project. That's a nationwide program to show support for the families of soldiers in the National Guard, Reserve and other military service.

In the past year, 4-H clubs from across the country stuffed thousands of black 4-H backpacks with items that will help children stay connected to their deployed family member. Those items include a disposable camera, photo album, stationery and envelopes. The 4-H'ers also included a letter thanking the pack's recipients for the sacrifices they make while their family member is on military duty.

"In my letter to the military family, I told them to keep up the good work on being role models in America, and that people like them help America to become a better place," Finken says.

Gail Slinde, a Ward County Extension agent who works with 4-H programs, likes the concept of a project aimed at the families of military personnel.

"You hear a lot about the troops, but the family that is left behind has a lot of struggles, too," she says.

The Hero Pack project is one of several ways in which the NDSU Extension Service is strengthening its partnership with the U.S. military.

Extension staff also provide educational programming in areas such as financial management, parenting and family communication in stressful times to families of deployed National Guard and Reserve soldiers.

4-H Youth Development staff are working with military personnel to develop 4-H clubs at the state's two Air Force bases in Minot and Grand Forks. The staff also are finding ways to get the children of military families living off base involved in 4-H activities.

The NDSU Extension Service received \$28,000 from the U.S. Department of Agriculture's Cooperative State Research, Education and Extension Service to aid the base 4-H club development efforts.

Providing programming to youth from military families is among the NDSU Extension Service's efforts to involve more youth in 4-H, says Brad Cogdill, chair of the NDSU Center for 4-H Youth Development.



Members of the newly formed Northern Lights 4-H Club at the Minot Air Force Base work on projects.



Educators conduct an experiment during their training to teach the Wonderwise science-based curriculum.

Other examples include:

- Wonderwise, a science-based curriculum that encourages students in grades four through six to improve their math and science skills and gives them information about careers in science and technology
- Archery in the Schools, a collaborative effort of 4-H, the North Dakota Game and Fish Department, state sporting groups and school districts that adds archery as a school physical education course
- 21st Century Learning Programs, after-school programming that exposes youth to learning experiences in areas such as math, science, social studies, art, sewing, nutrition, fitness and outdoor skills

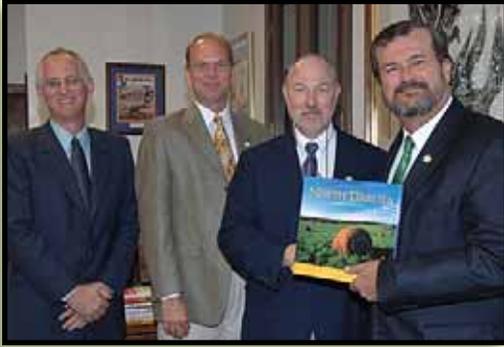
North Dakota has about 6,000 youth in 4-H clubs and another 41,000 who participate in other 4-H programs. That represents about 40 percent of the state's youth population, which makes North Dakota's 4-H program one of the strongest in the nation.

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Youth learn about archery through the 4-H outdoor skills program.



NDSU's David Wittrock (second from left) and Ken Grafton (third from left) meet with John Fernandez Van Cleve (far left) and Jorge Iván Vélez Arocho from the University of Puerto Rico, Mayaguez.

NDSU and University of Puerto Rico Mayaguez Form Collaborative Doctorate in Plant Breeding, Genetics

The NDSU College of Agriculture, Food Systems, and Natural Resources has entered into a collaborative doctorate program in plant breeding and genetics with the College of Agricultural Sciences at the University of Puerto Rico, Mayaguez.

Ken Grafton, dean of the NDSU college, says the University of Puerto Rico did not offer a doctorate in agriculture.

"This collaboration will provide an excellent opportunity for students to pursue graduate studies in agricultural research and for University of Puerto Rico faculty to mentor them," Grafton says. "It also will serve as an important step in the process of beginning an agriculture doctorate program at UPRM."

NDSU will grant the degree with the requirement that the student spends a minimum of one year on the NDSU campus and that an NDSU Plant Sciences faculty member serve as the student's primary mentor. The students will have a UPRM faculty co-chair and will be encouraged to conduct a portion of their dissertation research at UPRM.

David Wittrock, NDSU College of Graduate Studies dean, says the program is unique in that students may complete a significant amount of their coursework and research at UPRM, but will be NDSU students and participants in the Plant Sciences doctoral program.

Benefits include the opportunity to bring more students to NDSU and the additional connections and benefits that NDSU researchers and educators can make with UPRM. Wittrock says this creative model sends the message that NDSU can be innovative and that the university should be thinking beyond the modes of graduate education that have been offered traditionally.

Al Schneider, chair of the Department of Plant Sciences, says this is an exciting opportunity for both NDSU and UPRM.

"The real winners from this agreement will be the students who will have the opportunity to work with great NDSU faculty," Schneider says. "This is one of the things that NDSU is all about — creating opportunities for those who are willing to work hard."

UPRM students will have the opportunity to work with crops, such as corn, soybeans and sunflowers, grown in Puerto Rican winter nurseries in the temperate environment where they were developed, says Rich Horsely, Plant Sciences professor. There also is a summer internship program available for students considering enrolling in the program.

UPRM is a Hispanic land-grant institution with more than 12,000 students. It offers baccalaureate programs, and master's and doctorate options through the colleges of Engineering, Agricultural Sciences, Business Administration, and Arts and Sciences.

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NDSU Releases Dakota Crisp, a New Chipping, Tablestock Potato Cultivar

The North Dakota Agricultural Experiment Station released Dakota Crisp, a potato suitable for the chipping and table stock markets, this year.

According to Susie Thompson, NDSU potato breeder, Dakota Crisp is the progeny of Yankee Clipper, released by the University of Maine, and Norchip, an NDSU release.

Dakota Crisp was evaluated as ND2470-27 for 11 years (1993-2004) in statewide trials. It also was tested for four years in the north-central potato variety trial and for three years in the Snack Food Association/U.S. Potato Board trials.

Dakota Crisp has very good yield potential. In nonirrigated trials at Hoople, N.D., and Barnesville, Minn., between 2001 and 2004, yields averaged 325 and 250 hundredweight per acre for Dakota Crisp and Dakota Pearl respectively. The percentages of U.S. No. 1 tubers produced in the same trials were 84 percent for Dakota Crisp and 78 percent for Dakota Pearl.

In irrigated trials conducted between 2001 and 2004 at Larimore, Dawson and Tappen, N.D., the average yield of Dakota Crisp was 293 hundredweight per acre, compared with 265 hundredweight per acre for Dakota Pearl, a 28 hundredweight-per-acre increase. The percentage of U.S. No. 1 tubers produced was 85 percent for Dakota Crisp and 78 percent for Dakota Pearl.

Dakota Crisp has been tested and increased on several producer farms. Reports from the producers and industry have been very positive.

The taste-test ratings of Dakota Crisp following boiling, baking and microwaving are comparable to other chipping varieties, such as NorValley, Norchip, Atlantic and Snowden, according to Thompson.

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NDSU Researchers Developing Food Safety Sensor for Meat

Imagine a way to detect the agents that cause foodborne illness in meat before it reaches the dinner table.

Multiple NDSU departments are involved in a project to develop such a device. Suranjan Panigrahi, a professor in Agricultural and Biosystems Engineering, is leading the effort. Others involved are Marty Marchello, Animal and Range Sciences; Catherine Logue and Douglas Freeman, Veterinary and Microbiological Sciences; Jake Glower, Electrical and Computer Engineering; and Clifford Hall, Cereal and Food Sciences.

They are developing a sensor to spot pathogenic microorganisms, such as salmonella, in beef. They plan to extend their investigation to other microorganisms, such as E. coli 0157:H7, and other meat products.

"We are working on developing a hand-held model that could be used to scan products in a grocery store, check meat at the packing plant or check a meat package for possible contamination at any point in the food chain," Panigrahi says. "Our strategy is to identify and adapt the available advanced technologies for developing new-generation intelligent sensor systems for enhancing the safety of food products that we eat."

Marchello says their ultimate goal is a miniaturized version of the intelligent sensor that could be implanted in the material used to package meat. The system would emit some kind of signal to alert the user about the presence of pathogenic microorganisms in the meat.

Funding for the research came from a federal food safety grant through the U.S. Department of Agriculture's Cooperative State Research, Education and Extension Service.

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Research Benefits Beef, Barley, Ethanol Industries

NDSU research on distillers grain will benefit the region's beef cattle and barley producers, and the ethanol industry.

Researchers at the NDSU Carrington Research Extension Center say a recent study indicates distillers grain is a good protein supplement in barley-based growing and finishing diets for beef cattle. Animal scientist Vern Anderson says distillers grains make a barley-based ration more palatable for feedlot cattle.

Distillers grain is a byproduct resulting from the process that turns corn and other grains into ethanol. The region's ethanol industry is growing, which means beef producers will have a readily available supply of distillers grains, according to Anderson.

He says barley generally costs less than corn as cattle feed, and North Dakota produces more barley than any other state. Producers harvested 1.15 million acres this year.

Louis Arnold, chair of the North Dakota Barley Council, believes this research is vital to the state's barley producers.

"Utilization of barley as a complement to distillers grain provides barley producers with alternative market outlets," he says. "Barley also holds potential for use in manufacturing ethanol. Using barley in ethanol production, as well as feeding barley with distillers grain, provides a long-term market for barley growers while simultaneously providing benefits to livestock producers."

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Sean Brotherson reads to his children.

Study Reveals Keys to How Fathers Connect With Their Children

The most significant way for fathers to connect with their children is through participating in shared activities, according to a study co-authored by researchers from North Dakota State University and Brigham Young University.

The study was published in *Fathering*, a journal of research about men as fathers, and was led by Sean Brotherson, NDSU Extension Service family science specialist.

"How fathers connect with their children is important and gives insight into how parent-child relationships can be strengthened," said Brotherson.

Five central themes emerged:

- Personal involvement in shared activities
- Expression of support and care to ill or anxious children
- Interaction with children at birth or adoption
- Shared exchanges of time and affection
- Participation in spiritual activities with children

"A distinctive component centered on the recreational nature of the activities and the focus on relaxing and having fun with each other," Brotherson says. "This seems to facilitate companionship and enjoyment."

"The findings of this study," he says, "all point toward the tremendous value of building positive connections as a father. The voices of these men share a message of positive possibilities for fashioning healthy experiences of connection between fathers and their children."

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Numerous Factors Influence Cropping Decisions

Red River Valley producer Mark Askegaard checks whether his crops are ready to harvest.

Many factors go into an agricultural producer's decision on what to plant.

A market for the crops, good prices, the availability of disease-resistant varieties that grow well in this region and people's changing diets are a few of them.

In 1995, Mark Askegaard of Fargo began the transition from traditional to organic farming. His 800-acre farm 12 miles south of Moorhead, Minn., has been certified as 100 percent organic for the last five years. He grows golden flax, soybeans and spring wheat.

He decided to switch because of the expanding market for organically grown produce. Because of the growing interest in whole-grain foods, Askegaard is experimenting with grinding some of his wheat into whole-grain flour to find out if he has a market for it.

The demand for products affects the market price, and producers respond to what the market is doing, according to Robert Sinner, product and marketing manager for Sinner Bros. & Bresnahan Inc., a family-owned farming business near Casselton that produces, packages and ships food-grade commodities worldwide. He says soybeans are a good example of that process.

Research that indicates soy reduces the risk of cancer and heart disease has resulted in a significant demand for soy and products with soy in them, which, in turn, has increased the production of soybeans, he says. North Dakota producers planted 3.05 million acres in 2005, compared with 210,000 acres in 1980, the National Agricultural Statistics Service shows.

"That's probably the biggest change we've seen in the food industry," Sinner notes.

Producers say efforts at NDSU to develop and test new crop varieties and find new uses for crops also played a big part in their cropping decisions.





Producer Mark Askegaard brings some of his flax crop to the NDSU Pilot Plant for processing into flax seed meal.

For instance, NDSU researchers had done considerable work on flax as a food crop long before the general public became interested in it, says Frank Manthey, an associate professor in the Department of Plant Sciences. Historically, flax has been used to produce linseed oil, a major ingredient in oil paint, stain and varnish. Other researchers are studying the use of North Dakota-grown crops as livestock feed. In the last six years, the North Dakota Agricultural Experiment Station has released more than 25 new crop varieties that NDSU plant breeders developed.

Human nutrition research also could impact producers' marketing strategies. The latest dietary guidelines, based on years of nutrition research, encourage people to follow a healthy diet that includes whole grains, dry edible beans and healthy oils.

"The rising concern across the U.S. with obesity, related chronic disease and health-care costs may provide an opportune time to market the health benefits of many crops produced in the region," says Jane Edwards, an NDSU Extension Service nutrition and health specialist.

North Dakota leads the nation in the production of several crops, including flaxseed, canola and sunflowers, which are good sources of healthy oils.

The NDSU Extension Service has developed a series of educational materials that highlight the health benefits of area crops.

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Producers say efforts at NDSU to develop and test new crop varieties and find new uses for crops also played a big part in their cropping decisions.





Kevin Sedivec, Extension rangeland management specialist, and Amanda Hancock, Extension range and natural resources specialist, create rangeland monitoring plots.

Central Grasslands REC Starts Model Farm

North Dakota livestock producers soon may know whether they can make a living from an average-size ranch.

The NDSU Central Grasslands Research Extension Center near Streeter started a model farm this year to evaluate the best management practices that NDSU range and livestock researchers developed in the last decade.

“While we have no control over the market and cannot guarantee returns, we feel that proper management will help ensure as good a financial return as possible,” said Paul Nyren, center director.

The center received a \$93,000 Sustainable Agriculture Research and Education demonstration grant from the U.S. Department of Agriculture to conduct the two-year project. The grant includes funding for an NDSU Extension Service specialist to work one-on-one with producers to develop a system to monitor their rangeland’s health and a rangeland management plan to help them keep the land in good condition.

Gene Goven, a Turtle Lake area producer, likes the model farm approach because it looks at a ranch operation as a whole. Producers need to see the big picture to determine the sustainability of their operation, he said.

The model farm will operate with about 100 head of cattle. Nyren said that making a living with just 100 cattle would be difficult, but it’s an average-size herd for the region because many livestock producers also grow crops or have a job in town. The project will track the amount of time center staff spend caring for the cattle.

“Labor is one of the deterrents to more people getting into the livestock business,” Nyren said.

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Institute for Business and Industry Development Means Business

Don’t let the size of the NDSU Extension Service’s Institute for Business and Industry Development fool you.

IBID has a staff of just two part-time engineering specialists. But Reuben Tschritter and Jack Johnson have a combined 86 years of business experience to help businesses get started, expand or deal with a technical problem, and work with entrepreneurs who have an idea for a new product or service. The specialists also can connect their clients with more than 500 researchers at NDSU and other universities who can help solve issues such as inventory control, quality assurance, plant layout, staffing, training, material handling, product design and marketing.

“We feel IBID is the front door to businesses looking for help from NDSU,” Tschritter says. “Many of these companies don’t have any engineering support.”

Here are some results of IBID efforts in the last year:

- Fifty-nine clients each received more than eight hours of assistance
- Thirty-two of those clients took some action as a result of that assistance
- Eighteen clients achieved their expected results (others still are working to reach their goals)
- Clients kept or created 50 jobs
- Clients increased sales 5 percent
- Clients saved \$200,000 through changes such as updating equipment, reducing inventory or altering management procedures

Requests for IBID’s help included:

- Testing a polymer at low temperatures
- Developing a prototype of a floating fillet knife with a light
- Extracting amino acids from soybeans
- Creating a marketing and strategic plan for new auto steering technology in farm tractors
- Software development for a flour mill
- Research on new plastics made from wheat straw for cell phones
- Applying for research grants

A specialist conducts an initial assessment of a client’s needs free of charge. Then he may refer the client to the appropriate experts or arrange for company personnel to participate in seminars or training assessments. If a client needs more help, the specialist will develop a proposal outlining the services IBID will provide and a maximum cost for those services. IBID has been in existence since 1989.

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Farmers' Markets Growing in Popularity in North Dakota

Farmers' markets have been very popular along the East and West coasts for many years, says Rudy Radke, NDSU Extension Service value-added agriculture area specialist. Radke would like to see that same thing happen in North Dakota. He is on the board of directors of the North Dakota Farmers' Market and Growers Association. The organization was formed two years ago to promote farmers' markets in North Dakota. Radke also was a member of the committee to start the first national Farmers' Market Association through the North American Farmers' Direct Marketing Association. This group was formed just three years ago.

Radke is working with the North Dakota Department of Agriculture to increase the number of farmers' markets across the state. In the last year, 11 new markets were established for a total of more than 50.

"What we are lacking is growers, but that's changing," Radke says. He has attended meetings around the state to discuss the possibilities of growing products for a farmers' market. "Those interested in farmers' markets shouldn't just think in terms of growing a

product and then taking it to the market. I work with a farmers' market in Fargo that is one-third vegetable and fruit; one-third processed foods, such as jams, jellies and breads; and one-third cut or potted flowers and craft items. Offering a diversity of products may attract a broader base of consumers."

Radke says farmers' markets provide numerous advantages for growers:

- Provide another source of income
- Cut out the middleman for increased profit potential
- Increased learning opportunities and networking with other producers
- Good outlet for less intensively produced food and those selling organic products

Consumers benefit by:

- The food being fresh, often picked the day of the market
- Having direct interaction with the producer of the product
- Offer consumers another choice

Two years ago, two college students were hired by the North Dakota Agriculture Department marketing division to travel the state surveying existing markets and



Shoppers check out the wares at the Grand Forks Farmers' Market.

encouraging cities and growers to organize markets.

"The students have been surveying to find out what works and what doesn't," Radke says. "Now the Agriculture Department is out there sharing that information and encouraging people to organize more new markets."

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N.D. Agricultural Experiment Station Releases Six-rowed and Two-rowed Barley Varieties

Barley growers had two new varieties, Stellar and Rawson, available this year. Stellar is a six-rowed barley, while Rawson is a two-rowed barley. Both were developed and released by the North Dakota Agricultural Experiment Station.

Stellar is similar in disease resistance to Drummond, Legacy and Tradition. In general, Stellar has a lower level of scab severity and a similar level of deoxynivalenol (DON) as Robust, the most commonly grown variety. Stellar appears to accumulate slightly lower levels of DON than Drummond and Legacy, but more than Tradition. Its level of net and spot blotch are similar to all other varieties being grown.

"Stellar has produced consistently high yields," says Richard Horsley, leader of NDSU's six-rowed barley-breeding program.

"In 40 trials conducted at Research Extension Centers at Langdon, Carrington, Minot, Williston, Dickinson and Hettinger from 2002 through '04, Stellar outyielded Robust, Legacy, Drummond and Tradition by 8.1, 1.9, 5.8 and 2.5 bushels per acre, respectively."

Stellar has an excellent malt profile, according to Paul Schwarz, leader of the NDSU malting and brewing project. "It has lower grain

protein and greater kernel plumpness and malt extract than all other cultivars grown in North Dakota."

Based on five years of trials at Research Extension Centers in North Dakota, Rawson has slightly higher yield and better leaf disease resistance than Conlon, says Jerry Franckowiak, leader of the NDSU two-row barley-breeding program.

Rawson is similar to Conlon in fusarium head blight (scab) severity and slightly higher in DON levels. It is susceptible to some isolates of net blotch, but has excellent resistance to spot blotch and some resistance to Septoria speckled leaf spot.

One of the interesting features of Rawson is its kernel size, which is 15 percent to 20 percent larger than Conlon. Rawson has a high level of starch, making it a possible candidate for pearling purposes and feed, or perhaps for ethanol production.

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This is the original iris and daylily area.



In the future, plants needing shade will be planted in the tree area. Incorporated into the area will be a walking path and benches.



Scarlet runner bean, on the trellis, and sweet potato vines flourish in the new gardens.



Workers construct some of the flower beds in the spring.



These are some of the many plants featured in the NDSU gardens. Workers in the background are laying sod.



During the summer, many NDSU students helped lay sod.



Bryce Farnsworth, left, Barb Laschkewitsch, center, and Ron Smith inspect some of the plants in the garden.



New NDSU Garden Blooms

Phase one of new NDSU gardens at the corner of 18th Street and 12th Avenue North in Fargo is about 70 percent complete, according to Ron Smith, NDSU Extension Service horticulturist.

When completed, the horticulture garden will feature daylilies, irises and other perennials, plus annuals. Work on the project began last year.

"The new gardens will give students more research opportunities and serve as a beautiful entryway to the NDSU campus," Smith says. "In the future, we hope that the general public will take advantage of the garden by taking a tour and learning more about what varieties are available to them."

With its extensive collection of historic pre-1970 daylily cultivars, the NDSU garden is the only garden of its type in North America. The American Hemerocallis Society supports the area featuring the daylilies.

Barb Laschkewitsch, NDSU horticulture technician, has helped organize and manage the plantings. Bryce Farnsworth, also a horticulture technician, has lent his daylily expertise to the project. Andrea Carlson, a horticulture graduate student, helped design the gardens, and Wayne Larson, campus horticulturist, is responsible for mechanical aspects of the project, such as organization, soil mixing and planning.

Phase one of the project should be completed next year, Smith says. Phases two and three expect to be completed by 2010, or as funds become available. Plans call for the addition of a shade and rose garden, and turf research plots. The gardens eventually will extend over 10 to 15 acres.

Environmental horticulture, also known as the "Green Industry," is one of the fastest growing segments of the nation's agricultural economy. In 2002, a survey indicated the value of the horticulture industry in North Dakota was \$496 million. The survey did not include golf courses.

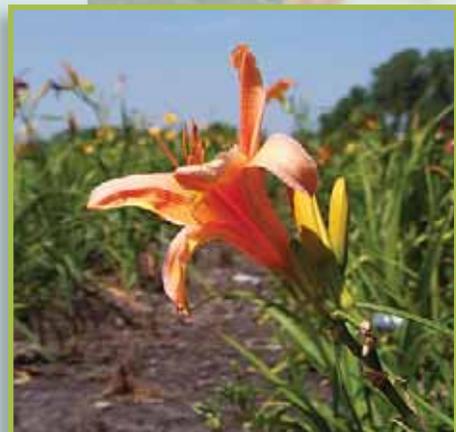
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Environmental horticulture, also known as the "Green Industry," is one of the fastest growing segments of the nation's agricultural economy.



Ageratum often is used in public gardens to bring a missing blue note to bedding patterns.



This is one of the many daylilies featured in the NDSU gardens.



Jim and Diane Yri have turned part of their farmstead into a resort for added income.

NDSU Focuses on Agritainment Opportunities

Some North Dakota farmers and ranchers, as a way to increase income, are looking at agritainment or agritourism opportunities. The NDSU Center for Community Vitality offers workshops to introduce opportunities available, such as lodging, hunting, fishing, birding, trails, pumpkin patches and corn mazes.

Jim and Diane Yri participated in a workshop and decided to move forward. The Yri family has a farm near Minnewauken, but lost more than 1,000 acres through the years as Devils Lake continued to rise. The couple decided that a resort next to their flooded farmland would give them the best opportunity for added income. Along with farming, Jim and Diane also now own West Bay Resort LLC.

“We decided that instead of cursing the darkness, we should light a candle,” says Diane. “It is hard work and difficult at times because I have two small children, but it has been very rewarding. Jim and I have met some wonderful people.”

Diane and Jim started out small, with just a few cabins near the lake. They now have six cabins and spots for 30 recreational vehicles.

“We started with cabins, but then we started getting about 40 people a week calling or stopping by asking if they could park their recreational vehicles on our land,” Diane says. “We now have 30 spots for parking and are considering adding more.”

The resort is not just for summer use, Diane says. People wanting to go ice fishing or snowmobiling in the winter can rent their cabins. In the works is a snowmobile trail that would go right through the Yri farm.

The Yri family still works their farm, so those using the resort have an opportunity to see planting, harvesting, making hay, working cattle or other farming activities.

Diane says attending a workshop on agritainment was very helpful.

“This is just one example of the many opportunities farm and ranch families have in the growing agritainment industry,” says Kathleen Tweeten, Center for Community Vitality director. “Our workshops are designed to help families explore possibilities and to determine if an agritainment business is a good fit for them. It is just as important to help people avoid costly mistakes as it is to help people start a new business.”

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Pesticide Applicators Earn Certification Through Problem-based Learning

The NDSU Extension Service has the responsibility to teach pesticide applicators about best practices for using pesticides.

In early 2004, Extension agents Brad Brummond, Craig Askim, Kendall Nichols and Nels Peterson met to discuss the private pesticide certification program.

“We all echoed sentiments from our local producers that many of them simply felt it was an exercise in endurance to become recertified in the private pesticide certification category,” says Nels Peterson, Nelson County Extension agent.

The agents set a goal of developing lesson plans that would teach pesticide best-practice methods without relying solely on lectures or prepared videotapes.

“We settled on problem-based learning (PBL), which is a teaching method that presents a problem and lets students solve the problem as a group,” Brummond says. “The agents decided to prepare a lesson plan using a modified PBL that could be completed in an hour or an hour and a half. The lesson was prepared using the North Dakota Weed Control Guide to provide guidance to the applicators in decision making and production planning.”

“Each county agent presented the objectives of the lesson and reviewed the problem with the participants at each training session,” Peterson says. “After dividing the participants into small groups, each agent facilitated discussion and assisted in guiding each group to find information and solve the problem. After each group solved its problem, it shared its solution with the entire class.”

After the training session, participants were surveyed on their classroom experience. The participants overwhelmingly approved of using problem-based learning.

As a whole, producers using PBL in their pesticide training appreciated the opportunity to use something other than videotapes as part of their pesticide training. Of those completing the survey, 75 percent felt that PBL was superior to videotapes. In addition, 80 percent of the producers felt the group work used in PBL was a good to excellent way to learn.

The North Dakota Weed Guide also received very good marks. Nearly 90 percent of the participants surveyed indicated that the guide provided everything necessary to complete the problem and that it could be used for nearly all weed-control decisions on their own farms.

Overall, 86 percent responded that participating in the pesticide training provided them with information that would be useful on their own farms.

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Three Durum Varieties Released by N.D. Ag Experiment Station

Divide, Alkabo and Grenora are durum varieties developed and released by the North Dakota Agricultural Experiment Station.

Divide, when compared at a number of NDSU Research Extension Centers during several growing seasons, has a 1-bushel-per-acre yield advantage over Mountrail. Divide has a higher test weight and larger kernel size than Mountrail.

Divide has similar end-use qualities as Belzer, according to Frank Manthey, director of durum quality research at NDSU. When compared with Mountrail and Lebsock, Divide has higher semolina protein content and much stronger dough properties. Pasta made from Divide has better color than Mountrail and greater cooked firmness than Lebsock or Mountrail.

Alkabo is the result of crossing two experimental lines, but contains the varieties Ward, Renville, Rugby, Crosby, Leeds, Wells and Fjord and a number of experimental lines in its parentage, according to Elias Elias, leader of the NDSU durum breeding program.

Alkabo has a 1-bushel-per-acre yield advantage, more than 1-pound-per-bushel test weight, greater kernel weight and much greater straw strength.

Alkabo has better end-use qualities than Mountrail, according to Manthey. When compared with Mountrail, Alkabo has similar semolina protein content, but has much stronger dough properties. Pasta made from Alkabo has better color and cooked firmness than pasta made from Mountrail.

When compared with Mountrail, Grenora yielded almost 2 bushels per acre greater.

The test weight of the two varieties was equal, but Grenora has a slightly larger kernel size than Mountrail. Grenora heads at the same time as Mountrail. Grenora is about 5 inches shorter and has a stronger straw than Mountrail. Leaf disease and fusarium head blight resistance is slightly better in Grenora than in Mountrail.

“Grenora has better end-use qualities than Mountrail,” Manthey says. “When compared with Mountrail, Grenora has similar semolina protein content, but has much stronger dough properties. Pasta made from Grenora has better color and cooked firmness than pasta made from Mountrail.”

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Horizons Community Leadership Program Gets Results for Rural N.D. Cities

The NDSU Extension Service’s collaboration with the Northwest Area Foundation to help small, rural North Dakota communities is paying off.

The foundation, a nonprofit organization based in St. Paul that fights poverty in an eight-state region, provided the Extension Service with grants to work with two community clusters for 18 months to help them reverse population and economic declines. The effort is called the Horizons Leadership Program.

The Extension Service hired a coach to work with each three-community cluster – Ashley, Ellendale and neighboring Eureka, S.D., and Mott, Beach and Regent. The Extension Service also provided the communities with the training, support and other resources to build the skills, connections and information base they need to reach their goals.

Lynette Flage, the Extension Service’s Horizons community leadership specialist, says the program also helps combat social poverty, which reveals itself when people feel disconnected or unwelcome in their communities and lack trust in their fellow citizens.

Here are some results of the Horizons program:

- Residents have been trained to become effective leaders by building partnerships, managing conflict and working together to solve problems and create opportunities.
- Ashley and Ellendale residents convinced the 2005 North Dakota Legislature to pass a bill that gives small-town housing authorities a tool – the ability to issue bonds – to finance moderate-income housing.
- Community leaders worked to get a cell phone tower built near Ellendale to improve telecommunication in the area.
- Some of the communities have developed a strategic plan for their future and are working on giving residents, particularly youths, more of a voice in community affairs.

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Mott and Regent residents work collaboratively during leadership training.

A photograph of a person wearing a hat and a vest, holding a rifle, standing in a field of tall, dry grass. The person is positioned on the left side of the image, looking towards the right. The background is a vast, open field under a clear sky.

NDSU to Study Hunting and CRP Land Management Systems

For the next four years, a group of North Dakota State University researchers will evaluate the economic and environmental consequences of agricultural land management alternatives, such as using the same land for grazing and hunting.

Funded by the National Research Initiative Competitive Grants Program in the USDA's Cooperative State Research, Education and Extension Service, the research has five major objectives, according to Larry Leistritz, NDSU Department of Agribusiness and Applied Economics professor. Leistritz will serve as the project director, along with project co-directors Christopher Schauer and Daniel Nudell, Hettinger Research Extension Center, and Kevin Sedivec, Extension rangeland management specialist.

The five objectives are:

- Look at the effect of multiuse land management systems on land taken out of the Conservation Reserve Program (CRP) and demonstrate the potential viability and sustainability of producing both agricultural products and wildlife during the same period.
- Evaluate recent and historic agricultural land sales to determine the ratios of local to nonlocal sales and purchases, as well as identify any changes in either the ratio of sales or purchase price over time.
- Identify land management objectives of the study area's landowners and evaluate the implications of alternative land management systems for farm/ranch profitability.
- Evaluate the implications of alternative land management systems on a regional economy and rural community viability.
- Develop nontraditional outreach efforts to disseminate the research findings to different interest groups, such as state and local decision makers, agricultural producers, local and absentee landowners, public and private land managers, and sportsmen and conservation groups.

"North Dakota has a substantial number of acres enrolled in CRP, but many of the contracts are set to expire before the end of the decade," Leistritz says. "At that time, landowners will need to consider whether to re-enroll or to manage it for agriculture, recreation/conservation or multiple uses."

A multiple-use management system could provide income stability, conservation benefits and recreational opportunities that would be beneficial to private landowners, sportsmen and rural economies.

A multiple-use management system could provide income stability, conservation benefits and recreational opportunities that would be beneficial to private landowners, sportsmen and rural economies, Leistritz says.

"The project team will conduct a series of field trials at the Hettinger Research Extension Center testing and demonstrating the effects of alternative land management systems on

agricultural and environmental outputs, such as livestock forage, production and wildlife habitat value," Schauer says. "Biological data collected during the trials will provide important insights regarding key land management/policy questions."

The study will provide significant implications for Montana, Wyoming, and North and South Dakota.



Proper habitat care provides food and shelter for wildlife. This Billings County scene shows how management can protect natural resources, offer economic opportunities for surface land managers and recreational opportunities to hunters.

"No research in the four-state region, of which we are aware, has evaluated a systematic management and land-use plan that provides adequate upland game habitat, cover and food while providing some level of sustainable agricultural production," Sedivec says.

Anecdotal evidence suggests that substantial amounts of agricultural land in the region are being sold to buyers who live outside the region, possibly for prices higher than agricultural use would justify, Nudell says.

"Agricultural land transfers in a sample of the 36-county study area will be examined to determine the proportion of transfers and acreage going to absentee buyers and the ratio of prices paid by absentee versus local buyers," Nudell says.

Others involved in the study include Dean Bangsund and Nancy Hodur, Department of Agribusiness and Applied Economics research scientists.

The researchers received a National Research Initiative (NRI) grant of \$465,000 for the study. In 2004, 3,296 grant proposals were submitted to the NRI. Of those, 495 were funded. NRI is charged with funding research on key problems of national and regional importance relevant to agriculture, food, the environment and communities on a peer-reviewed basis.

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Looking at the Future Through the Eyes of the Past

"I know of no pursuit in life in which more real and important services can be rendered to any country than by improving its agriculture, its breed of useful animals, and other branches of a husbandman's care."

- George Washington

NDSU Institute of Barley and Malt Sciences Approved

In January, the North Dakota State Board of Higher Education approved the Institute of Barley and Malt Sciences at NDSU. The mission of the institute is to provide reliable, high-quality, targeted research and education for barley producers and those in the domestic and international malting and brewing industries.

"An advantage we have at NDSU is the fact that we have a strong vertically integrated research and education structure in place," says Stephen Neate, Plant Pathology associate professor. "There are a lot of brewing research institutes around the world, but not one that addresses the issue of all aspects of producing high-quality malting grains. That's something we are strong on here at NDSU."

"This institute will allow us to have a process where we can take on bigger projects using cross-discipline skills and help the industry identify future problems," says Paul Schwarz, institute director and NDSU barley quality chemist. "We will be able to be proactive in our research rather than reactive."

The institute will have a board of directors composed of individuals from commodity groups, the malting and brewing industries, and NDSU.

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AgBiotechnology Center of Excellence Established at NDSU

Recognizing the large potential from future developments in agricultural biotechnology, an AgBiotechnology Center of Excellence has been established at NDSU.

"North Dakota has realized more than \$700 million in benefits from current crop biotechnology traits, but this is only a fifth of the benefit that has been realized by states that have aggressively pursued biotechnology," said Bill Wilson, NDSU Department of Agribusiness and Applied Economics professor.

Ken Grafton, College of Agriculture, Food Systems, and Nature Resources dean and director of the North Dakota Agricultural Experiment Station, said the purpose of the center is to facilitate the sustainable, long-term development of agricultural biotechnology in North Dakota.

"It has the potential to increase producer net income," he said. "This is done through investments that bring about the commercialization of biotech crops."

Grafton acknowledged the governor's office and Legislature's support for the center and said they should be credited with forward thinking.

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Workers install a fluxmeter, which will measure water percolation beyond the root zone.

NDSU Researchers Study Devils Lake Basin Water Use

Two NDSU researchers are working on a water use test project in the Devils Lake basin.

Dean Steele, an associate professor in the Department of Agricultural and Biosystems Engineering, and David Hopkins, an associate professor in the Department of Soil Science, selected 10 test sites. Eight will have full-size center-pivot irrigation systems. The other two will have smaller units.

One objective is to determine the amount of water irrigated crop production can use, compared with nonirrigated crop production. They'll measure rainfall, irrigation, soil water content, groundwater levels and water percolation below the root zone to determine a water budget at each site. They will use remote sensing techniques to estimate crop water use on a basinwide scale.

Another objective is to determine the sustainability of irrigation at the sites through intensive sampling of the soil's physical and chemical properties before, during and after the study's irrigation phases. These tests are critical because many of the soils in the Devils Lake basin are considered to be only conditionally irrigable, researchers say.

They plan to extend the results from the test sites to the rest of the basin using geographic information system techniques. This will help determine the feasibility and sustainability of irrigation on a larger scale.

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Budgets and Grants Support Programs, Research, Outreach

The North Dakota Agricultural Experiment Station and NDSU Extension Service receive funds from a variety of sources. This diversity strengthens programs. Federal, state and county government funds provide a base for programs, funding important research and outreach.

Income from grants, gifts, contracts, revenue and other sources has grown steadily the past few years. These dollars target specific needs. Here are examples of major grants earned by NDSU AES and Extension faculty and staff.

Food Safety Education in the 21st Century: Understanding and Improving Food Handling Knowledge and Behavior Among Hard-to-Reach Audiences

\$569,000 over three years to the NDSU Extension Service

Co-directors:

Julie Garden-Robinson, NDSU Extension food and nutrition specialist

Kathleen Slobin, chair of NDSU Department of Sociology and Anthropology

"This project has the potential to be a model program in food safety education for diverse populations, with a Web site that could be used worldwide in food safety education at both the individual and retail level." Julie Garden-Robinson

NDSU High Throughput Genotyping Center

\$459,000 to the Department of Plant Sciences

Director: Shahryar Kianian

"The center, funded by a National Science Foundation-DBI MRI grant, will have state-of-the-art equipment for DNA genotyping, such as a custom robotic system that can extract DNA from various tissue samples and biological contaminants from other sources. The equipment will be available for use by research faculty and students on the NDSU campus for high throughput applications." Shahryar Kianian

Agrosecurity: Disease Surveillance and Public Health

\$1,360,755 to the Department of Veterinary and Microbiological Sciences/
Department of Veterinary Diagnostic Services/North Dakota Agricultural Experiment Station

Project Director: Douglas Freeman

"The overall goal of this biosurveillance initiative is to enhance state, regional, and national agricultural biosecurity and public health through research, education and service. The specific objective is to rapidly identify, diagnose, contain or prevent a disease outbreak in North Dakota livestock and crops. Current primary issues are diagnostics, disease prevention and animal identification/tracking. We will improve our management of the usual and strengthen our response to the unusual or unthinkable." Douglas Freeman

Family Nutrition Program: Nutrition Education for Limited Income Audiences

\$1,583,874 in USDA funding for Program Year 2005-2006

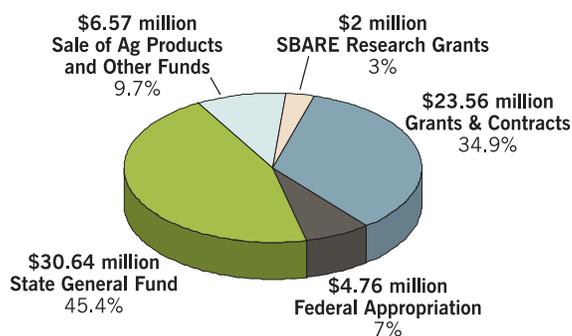
Co-directors:

Barb Holes-Dickson, NDSU Extension Service EFNEP/FNP coordinator

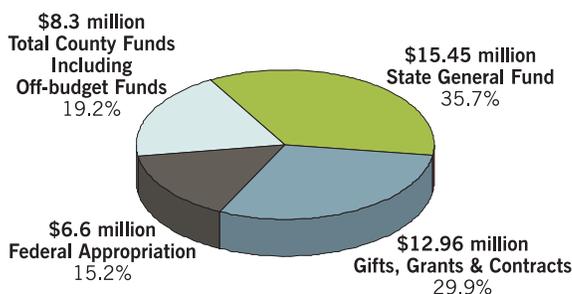
Jeanne Hochhalter, NDSU Extension Service EFNEP/FNP specialist

"This project brings two county operations together in a collaborative effort – county social services administers the food stamp program benefits and county Extension personnel offer educational programming to help citizens maximize the use of those benefits." Barb Holes-Dickson

N.D. Agricultural Experiment Station
Main Station 2005-07 Budget by Source of Funds



NDSU Extension Service
2005-07 Budget by Source of Funds



Agriculture at North Dakota State University



Duane Hauck, D.C. Coston 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.

D.C. Coston

Vice President for Agriculture and University Extension

Duane Hauck

Director, NDSU Extension Service

Ken Grafton

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These are the North Dakota State Board of Agricultural Research and Education (SBARE) members. SBARE is responsible for overseeing agricultural research and Extension at NDSU. Seated: (left to right) D.C. Coston, Ole Aarsvold, Randy Christmann, Carol Goodman, Tom Borgen, Jerry Effertz, Paul Langseth. Standing: Roger Johnson, Edmund Goerger, Larry Lee, John Bollingberg, Bob Bahm, Jerry Doan, Ken Grafton, Duane Hauck. Not pictured: Rodney Howe, Joseph Chapman