

# Research & Extension

Creating LEADERS Enhancing LIVES

Inspiring INNOVATION

Empowering YOUTH

Improving LIVESTOCK PRODUCTION

Forging PARTNERSHIPS

Breeding Better CROPS

Advancing TECHNOLOGY

Invigorating the ECONOMY

Exploring OPPORTUNITIES

North Dakota  
Agricultural  
Experiment  
Station

NDSU Extension  
Service

**NDSU**

2009 ANNUAL HIGHLIGHTS

North Dakota State University



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Duane Hauck, D.C. Coston and Ken Grafton

Norman Borlaug received the Nobel Peace Prize (the only agricultural scientist to be awarded a Nobel) for development of wheat varieties that sparked the “Green Revolution.”

Until his death at age 95 in September 2009, Borlaug was active, traveling worldwide developing wheat and speaking out about the world’s future. He observed that between 2009 and 2050, the world has to produce as much food as it has in the last 10,000 years. Think about that – in 40 years, we have to produce what we have in 10,000 – a daunting task to say the least!

This call to action occurs at the same time that agriculture is being asked to play a major role in addressing the world’s energy needs. This also occurs at the same time that society is asking to have a bigger voice in how food is produced and how agriculture is conducted.

The need for development of new knowledge and getting that knowledge into the hands of producers, agribusiness, policymakers and other leaders is paramount. This Annual Highlights publication provides snapshots of accomplishments by the women and men of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. We are called on to address the issues of today and to have the foresight to lead in solving the dilemma that Borlaug posed. Our programs today are developing the foundation for that 40-year period.

We believe that North Dakota can have an even bigger role than it already enjoys in meeting these challenges. What are some indicators that make us optimistic?

- North Dakota knows how to export efficiently and profitably and has great business connections throughout the world.
- The adoption of reduced- and minimum-tillage systems has improved productivity and reduced soil losses in North Dakota.
- North Dakota crop producers have adopted new crops. Think of the crop mix in the state today compared with a couple of decades ago.
- North Dakota producers have rapidly adopted new technologies to better serve customer demands and expectations.
- Livestock producers have adopted new genetics that have spurred productivity and quality gains.
- Producers of many products have become involved in adding value through identity preservation and processing.

This willingness of agribusiness, agriculture and community leaders to move quickly to take advantage of opportunities provides NDSU with great inspiration to be partners with them in developing ideas and solutions. We have a grand tradition of working elbow to elbow with our citizens in building a bright future for North Dakota. We believe North Dakota can continue to thrive and play vital roles in meeting the grand challenge that Borlaug put forth.

# State Funding Enhances NDSU Agricultural Research and Extension Programs

“Governor Hoeven and the Legislature have provided us with the tools to better serve the citizens of North Dakota,” says D.C. Coston, vice president for NDSU Agriculture and University Extension.

Coston is referring to the signing of legislative bill SB2020 by Gov. John Hoeven that provides funding for the North Dakota Agricultural Experiment Station, NDSU Extension Service, Northern Crops Institute and Upper Great Plains Transportation Institute.

The governor signed the bill May 7 during a ceremony on campus.

“Through this bill, we will continue our work to expand agricultural and agribusiness opportunities and enhance rural communities, urban and rural horticulture, managing family finances, and food safety and nutrition programs,” Coston says.

A component of the bill calls for expansion projects at NDSU Research Extension Centers in Minot, Williston, Dickinson and Langdon.

“Research at the North Dakota Agricultural Experiment Station in Fargo

and Research Extension Centers throughout the state is critical to the future of the state as we seek to improve crops and livestock to compete in a global market,” says Ken Grafton, North Dakota Agricultural Experiment Station director and dean of the College of Agriculture, Food Systems, and Natural Resources.

A key component of the bill is funding for NDSU’s main research center greenhouse project. Located on campus, the facility will provide a state-of-the-art complex to advance research capabilities and enhance student education.

Funding also was provided for a new beef research facility.

New pulse, oilseed and wheat quality research and education initiatives were funded. Additional plant pathologists, a forage agronomist and an irrigation specialist will enhance research in those fields of study.

New Extension Service programs for 4-H, agribusiness and rural development, Parent Resource Centers and county agents-in-training were provided for in the legislative bill.

“We are very pleased that the North Dakota Legislature provided funding support to expand Extension Service programs,” says Duane Hauck, Extension Service director. “The new programs will put us in a better position to help producers, families and communities grow both economically and socially.”

The Northern Crops Institute (NCI) received funding for a wheat milling specialist who will be responsible for NCI’s wheat milling efforts, including the pilot-scale durum mill that NCI is reconfiguring to mill hard red spring and winter wheat in addition to durum. Completion of the first two phases is planned for August 2010.

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# eXtension

Answers Life's Questions

Is worrying about your retirement keeping you awake at night? How big does your livestock manure storage facility need to be? Are insects chewing holes in the leaves of your favorite tree?

Solutions to those and many other questions are available any time you need them through a new Web-based information resource called eXtension.

NDSU is one of 74 universities involved in eXtension (pronounced E-extension), which is an interactive learning environment that provides reliable information based on solid research and trustworthy, field-tested data from land-grant universities across America. It complements and enhances Extension's community-based programming.

eXtension content is organized around resource areas known as communities of practice that focus on specific topics. Those topics include horticulture, personal finance, horses, cattle, entrepreneurship, geospatial technology, corn, soybeans, diversity, wildlife damage and management, organic production and dealing with disasters. The list grows monthly, and the content evolves constantly.

"I am excited to be involved in developing this resource because it provides access to timely, unbiased and accurate information for consumers 24/7," says NDSU Extension Service family economics specialist Debra Pankow. She is among the NDSU Extension Service specialists and county agents who are part of the national group that developed Financial Security for All, one of the first communities of practice.

NDSU Extension specialists also are involved in developing other communities of practice, including agrosecurity, flooding and geospatial technologies resource areas.

NDSU Extension geospatial specialist John Nowatzki, who helped develop Map@Syst, the geospatial technologies community of practice, says it will be particularly beneficial to county government staff because it answers questions about geographic information system computer programs, global positioning systems and remote sensing.

eXtension provides information a number of ways, including articles from resource area experts and answers to frequently asked questions. It also helps Extension staff collaborate with colleagues across the country to reduce duplication of efforts. But unlike most other Web-based information resources, eXtension also has experts from universities throughout the country ready to answer specific questions.



eXtension material was  
viewed nearly

445,000

times in 1 month

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# NDSU Provides Wind Energy Information

Rising oil and natural gas costs and concerns about long-term environmental effects of consuming fossil fuels are intensifying the interest in wind energy development in North Dakota.

Rural areas also view wind energy as an economic development opportunity, and landowners see it as a way to increase their income if they allow wind turbines to be installed on their property.

To help people learn more about this developing industry, four NDSU faculty — biofuels economist Cole Gustafson, farm economist Ron Haugen, farm management specialist Dwight Aakre and energy educator Carl Pedersen — held about a dozen educational sessions throughout North Dakota and one in South Dakota in 2009.

With assistance from North Dakota Public Service Commission members and attorneys at some of those sessions, they spoke on topics such as wind energy financing and regulation, energy efficiency and wind turbine leases. A total of about 400 people attended their presentations at workshops, agricultural producer meetings and lenders conferences.

Haugen and Aakre also developed a publication, “Wind Turbine Lease Considerations for Landowners,” to offer landowners guidance before they sign a contract with a wind energy development company. Gustafson created the “Wind Financial Calculator,” an online tool to help individuals evaluate the investment potential of wind energy using localized wind information from their area.

Gustafson also developed an online discussion forum, [www.plainswind.org](http://www.plainswind.org), to help foster peer education on the topic. In addition, he is the lead developer of eXtension’s Web site on wind energy. Seven states in the High Plains area are collaborating on this effort.

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North Dakota has nearly  
**500**  
wind towers





## Barley, Distillers Grains Make

# Great Cattle Ration

Research at NDSU's Carrington Research Extension Center has proven the value of combinations of barley and distillers grains as feed for ruminant animals, including beef and dairy cattle.

"Barley and distillers grains fed together provide a safe, nutritious, palatable and productive diet," says Vern Anderson, an animal scientist at the center.

One study included wet and dry distillers grains with urea as the rumen-degradable protein source in barley-based beef finishing diets. The study showed that dry-matter intake (DMI) improved with any distillers product in the diet. Daily gains also were significantly greater with wet and/or dry distillers grains in the ration.

A second study with barley finishing rations evaluated stepped increases of dry distillers

grains (0 percent, 12 percent, 24 percent and 36 percent of DMI). Steers ate more feed and gained weight faster on the 24 percent distillers grains diet than the other three diets.

The studies also indicated that corn can be fed with distillers grains, but the feed ration needs an additional degradable protein source, Anderson says.

More research is planned on barley-distillers grain combinations as feed for newly weaned calves.

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North Dakota produces  
enough beef annually for

# 103 million

hamburgers

NDSU Extension

# Assists Flood Victims

North Dakota county Extension Service office phones rang continuously in spring 2009. When floodwaters rose, county residents needed help.

“They know we are a source of valuable information, and they were utilizing it,” says Doug Bichler, one of two Emmons County Extension agents.

Agents often fielded calls from early morning until well into the evening, seven days a week. Agents also served as their county’s evacuation coordinator; worked with volunteers, many who came from other states to help with flood cleanup; and assisted livestock producers who were running short of hay or had trouble getting feed to stranded cattle because snowstorms blocked access to them or flooding washed out roads and bridges.

In addition, Extension agents worked with their local news media to get articles with information on flood preparation and cleanup into newspapers, created public service announcements, distributed publications to anyone who needed them, and encouraged city and county governments and the news media to link to NDSU’s flood information Web site from their Web pages.

Radio became an effective way for Extension agents and specialists to reach people who didn’t have time to read a newspaper or publication. Several county agents became regulars on their local radio stations. Extension agricultural engineer and flood expert Ken Hellevang also was a guest on numerous radio talk shows. NDSU Extension family science specialist Sean Brotherson went on the air to advise people on handling the stress of flood fighting. Hellevang, Brotherson and NDSU Extension Director Duane Hauck taped audio public service announcements with flood-related information.

“We wanted to make sure people received accurate information, and we tried to provide that information in a number of ways,” Hellevang says.

But the NDSU Extension Service’s role in the flood fight began even before the water started to

rise. Extension specialists updated information on NDSU’s flood Web site. The site has information to help people prepare their farms, ranches and homes for a flood and cope with the aftermath, as well as links to information from other universities and organizations such as the Extension Disaster Education Network, American Red Cross and eXtension, a Web-based information resource.

Extension specialists worked with NDSU Agriculture Communication writers to develop news releases to promote the Web site and provide specific advice. Hellevang helped create a video on how to build a sandbag dike properly.

Extension agents and specialists also worked closely with other agencies, such as the North Dakota Department of Agriculture, Farm Service Agency, soil conservation districts, Natural Resources Conservation Service, county commissions, county emergency management boards and law enforcement to make sure residents received assistance and information about governmental and private programs to help them.

As the floodwaters receded and snow melted, Extension agents took on another role: At the request of the state veterinarian, they collected information from producers about the accessibility to livestock and the loss of animals. Agents also helped the Agriculture Department coordinate efforts to rescue stranded livestock, worked with producers on how to dispose of dead animals and gathered estimates of acres on which producers wouldn’t be able to plant or planting would be delayed.

Several county Extension offices provided moisture meters that homeowners could check out to determine if they adequately dried the wood in their homes and other buildings that flooded before rebuilding.

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More than  
**2,000**

people viewed an NDSU Extension  
video on building sandbag dikes



# Researchers Study Meningitis- causing Bacteria



Researchers in NDSU's Veterinary and Microbiological Sciences Department have developed a model to test meningitis-causing bacteria, including one that may be found in powdered infant formula.

Meningitis is an inflammation of the protective membranes covering the brain and spinal cord. It can be caused by a virus or bacterium. Bacterial meningitis can be quite severe and may result in brain damage, hearing loss or learning disabilities.

The researchers have developed a model of a blood-brain barrier using cells from a mouse. The blood-brain barrier prevents materials in the blood from entering the brain.

The research has been focused on various strains of *Cronobacter*, formerly known as *Enterobacter sakazakii*, which has been known to penetrate the blood-brain barrier and cause meningitis and brain abscesses in babies. *Cronobacter* species also have caused other diseases in premature infants. Those diseases include necrotizing enterocolitis (the death of intestinal tissues), septicemia (a life-threatening infection that frequently occurs at the same time as meningitis) and other central nervous system infections.

Two of the strains being tested are from cattle and bison feces. Tests indicate the cattle strain is harmful to the model blood-brain barrier, but the strain from bison hasn't caused any damaging effects.

The researchers also are studying whether other environmental and clinical *Cronobacter* strains show evidence of causing damage to the blood-brain barrier in the model they developed.

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# Operation: Military Kids Eases Deployment Stress

Having mom, dad, a brother or a sister deployed for military duty can be scary and stressful for a child.

To help ease the trauma, NDSU's Center for 4-H Youth Development teamed up with all U.S. military branches and organizations such as the American Legion and National Association of Child Care Resource and Referral Agencies on a program called Operation: Military Kids (OMK).

Launched in 2005, OMK is a nationwide program that creates a network of support for children of military families and connects them with other youth who are experiencing a family member's deployment, as well as with youth from nonmilitary families, through recreational, emotional, social and educational programs.

North Dakota was awarded its first OMK Camp Initiative grant in 2009 to provide camps that offer youth of different age groups a variety of experiences, including outdoor skills such as archery, air rifle training and camp cooking, and technology such as digital photography, videography and robotics.

The camps also included the Military Youth Institute, held during the Extension Youth

Conference in June. Participants created a short video showing what life is like for a child of a military family. They used OMK's Mobile Technology Lab, which contains video and digital cameras, laptops, scanners, printers and other equipment, to make the video. They showed the video during the conference's closing ceremony.

The North Dakota OMK initiative also worked on heightening community awareness of challenges youth of military families face with the deployment of a loved one. As part of this effort, nonmilitary youth groups wrote letters of support to military children and their families to thank them for their sacrifices and service to the U.S.

Nearly 300 North Dakota youths participated in OMK activities in 2009.

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21,170  
youth participated in  
4-H programming in 2008



18 U.S.C. 707



# Energy Efficiency Proponents Join Forces

To demonstrate just how much energy some home electrical devices use, NDSU Extension Service energy educator Carl Pedersen developed an “energy bike” that powers a small generator. People can hop on the bike and pedal to power various types of light bulbs and electrical devices.

The energy bike is one of several ways he teaches people about energy efficiency. But he soon realized he isn’t alone. Other organizations also help people reduce their energy use.

That discovery led Pedersen and others to form the North Dakota Energy Efficiency Partnership. It’s a collaboration of individuals and public and private entities working together to promote the efficient use of energy.

“The Energy Efficiency Partnership was formed as an effort to bring all interested and involved parties to a common understanding to help make informed and educated decisions concerning energy use,” Pedersen says. The partners’ aim is to avoid duplicating efforts by identifying areas for improving energy efficiency and determining who is best qualified to provide assistance.

The partnership consists of about 65 individuals and organizations, including NDSU faculty and representatives from the U.S. and North Dakota Department of Agriculture, North Dakota Department of Commerce, electric and gas utilities, rural electric cooperatives, North Dakota Farmers Union, Dakota Resource Council, North Dakota Builders Association and other North Dakota colleges and universities.

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# Pulse Crop Research Advances



North Dakota leads the nation  
in the production of

13

commodities

NDSU pulse crop breeders are a step closer to developing new varieties of dry peas, lentils and chickpeas that have high yields, high-quality seed and good agronomic traits such as lodging resistance.

Breeders have identified 16 pea breeding lines as being superior. These were among 31 new lines that researchers from NDSU's North Central Research Extension Center near Minot have been testing in field trials at six locations throughout the state.

This research is part of NDSU's new pulse crop breeding program. North Dakota is the nation's No.1 producer of dry peas and lentils. Because of the need for new varieties specifically adapted to North Dakota, the 2007 Legislature approved the establishment of the program and two new positions: a pulse crop breeder in Fargo and an assistant pulse crop breeder at the North Central Research Extension Center.

The position in Minot is advantageous because it gives the breeding program a strong presence in North Dakota's main pulse growing region, according to NDSU pulse breeder Kevin McPhee.

Experiments conducted at the Minot center and elsewhere in the state include variety trials, preliminary and advanced yield trials, disease screening, single-plant and row selections, and crop hybridizations to recombine favorable traits.

Researchers are evaluating 35 new lines of dry peas in preliminary trials and 223 new lines in single-plot trials. Lentil trials, which focused on red cotyledon types, included early generation and advanced yield trials. Limited seed quantities restricted evaluations to two locations. However, advanced and early generation lentil trials included 32 and 215 entries, respectively. Six hundred progeny rows were evaluated in the 2009 field trial season for agronomic traits and seed quality, and will serve as the basis for future experiments.

Researchers also are identifying superior dry pea, lentil and chickpea plants from seeds obtained in germplasm exchanges with other countries, including Bulgaria, Australia and Canada, says NDSU assistant pulse crop breeder Shana Pederson. They are looking for plants with good architecture, resistance to lodging and disease resistance that are adaptable to North Dakota's growing conditions.

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# Carrington REC Evaluates Fruit Varieties

National and statewide interest in fruit production and winemaking prompted the NDSU Carrington Research Extension Center to initiate and invest in the Northern-Hardy Fruit Evaluation Project in 2006. The project evaluates fruiting plant selections that are hardy in northern latitudes and desired in current or emerging fresh or processed food markets. The CREC's central location allows for the translation of growth and production data to the diverse growing regions of the state.

The CREC installed a deer-exclusion fence to protect six acres and began the project with the planting of apples, plums, and Juneberry and grape variety trials that complement the larger trial installed at the NDSU research arboretum near Absaraka. By spring 2008, 468 plants were growing in three variety trials and 287 plants were divided into observational plantings of 15 other types of fruit. In 2009, most selections produced fruit.

In 2009, more than 100 people sought information on the fruit project by attending two field day tours or through individual contact. Three large-scale installations of fruit have been initiated in North Dakota in 2009 by growers who received information from this project.

"It is really exciting to be a part of the movement to get back to our own food production," says Kathy Wiederholt, CREC fruit project manager. "Growing fruits locally is good for consumers, processors and the economy of our rural communities. A few fruiting shrubs are easy to fit into your home landscape or your income diversification plan."

## Observational plantings:

Apples: 6 varieties  
Aronia: 4 varieties  
Joy Bush Cherry: 1 variety  
Evans Tree Cherry: 1 variety  
US-Sk Bush Cherry: 2 varieties  
Black Currant: 5 varieties  
Red Currant: 5 varieties  
White Currant: 4 varieties  
Elderberry: 4 varieties  
Gooseberry: 13 varieties  
US-Sk Haskap: 5 selections  
Russian Honeyberry: 5 varieties  
Oregon Honeyberry: 6 selections  
Plums: 4 varieties  
Seaberry: 6 varieties

## Variety trials:

Black Currant Variety Trial: 5 varieties, 80 plants  
Juneberry Variety Trial: 5 varieties, 100 plants  
Grape Variety Trial: 18 varieties, 288 plants

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More than 350 North Dakota families participated in a program in 2009 to select superior varieties of vegetables to grow. It is the largest such project in the country.

“These gardeners are improving the health and economic welfare of families by discovering superior varieties to grow in North Dakota,” says Tom Kalb, Extension horticulturist for the western part of the state and project coordinator. “A superior variety can lead to major increases in yield and food quality. It also is a health issue because three out of every four North Dakotans need more vegetables in their diet. Vegetables are nature’s richest source of vitamins and micronutrients.”

Gardeners in the program select varieties from more than 40 different vegetables. That includes everything from asparagus and beans to zucchini. The gardeners evaluate varieties for plant vigor, health, earliness, yield and quality.

“We can support increased production in the state by providing growers with research-based information on variety performance,” Kalb says. “The best way to determine the best varieties for home gardeners is to test them under actual home garden conditions. Our backyard researchers are doing a tremendous service to their state.”

North Dakota gardeners grow more than \$30 million in produce each year, which Kalb says can be increased substantially as more superior varieties are grown.

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## Gardeners Help Select Veggie Varieties



## BBQ Boot Camp Dishes Out Knowledge and Tasty Food

More than 700 North Dakotans learned the secrets of grilling a tasty steak, burger, chop or kabob and the importance of handling meat safely.

NDSU meat science faculty partnered with food science faculty and the NDSU Extension Service to hold 10 BBQ Boot Camps throughout the state in spring and summer 2009.

The program introduced people to new cooking methods and practices; meat cut selection; food safety, such as proper cooking temperatures and using meat thermometers; use of rubs, marinades and seasonings; and smoking, gas and charcoal cooking. Participants also heard about current topics in the pork, beef and lamb industries, including research and Extension activities at NDSU, and had a chance to sample a large variety of barbecued meat.

"BBQ Boot Camp is a unique opportunity to explain and discuss current topics in the food industry at the grass-roots level, all while having a lot of fun with barbecue," says NDSU Extension swine specialist David Newman, who organized the event.

The North Dakota Pork Producers Council, North Dakota Lamb and Wool Producers Association, North Dakota Beef Commission, Northern Plains Distributing Inc. and Cloverdale Foods helped sponsor the camps.

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# BBQ BOOT CAMP



**NORTH DAKOTA  
STATE UNIVERSITY**



North Dakota has about  
**1.75 million**  
head of cattle

## Center to Strengthen NDSU **Beef Research**

NDSU soon will have a state-of-the-art beef research facility.

The second phase of the Beef Cattle Research Center is scheduled for completion in late 2010.

“This facility will put NDSU on par with the best research facilities in North America when it comes to beef cattle research,” says Greg Lardy, NDSU Department of Animal Sciences head. “We are very excited about the possibilities it brings to the department and to the department’s mission of serving North Dakota’s beef cattle industry. It complements our existing strengths nicely and will allow us to make strides on a number of important research areas.”

The center, which is west of the NDSU campus, will enhance work in nutrition, physiology, animal health, genetics, meat science, nutrient management, food safety and economics.

The 2009 North Dakota Legislature approved \$2.6 million to complete Phase 2. That includes the addition of specialized feeding equipment and a feed-handling center, as well as fencing, pens and cattle-handling equipment, for the 180-head-capacity facility. Phase 1, the construction of the center, was completed in September 2008.

Because of the specialized feeding equipment that will be installed, this facility will give NDSU a unique advantage in beef cattle research. The equipment allows cattle to be fed individually yet housed in pens. Only three other research units in North America — a U.S. Department of Agriculture facility in Nebraska and two facilities in Canada — will have similar equipment capable of monitoring feed intake on an individual animal basis.

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## North Dakotans Find Extension Service

# Relevant, Useful

North Dakotans are aware of the NDSU Extension Service and give it high marks, a new study shows.

Eighty-three percent of state residents surveyed reported having heard of the NDSU Extension Service. That was more than double the percentage of people nationally who are aware of their state's Extension program.

The awareness question was one of several posed to North Dakotans as part of a national Extension brand value study that Copernicus Marketing Consulting and Research conducted for the National Association of State Universities and Land-Grant Colleges.

Also, 83 percent of those surveyed who have used Extension services rated the NDSU Extension Service as excellent or very good.

"I am gratified to see that North Dakotans recognize the NDSU Extension Service as a trustworthy source of the most current research-based information to help them improve their lives," says Duane Hauck, NDSU Extension director.

The NDSU Extension Service's 4-H Youth Development program also received a high awareness score from state residents in the survey: 83 percent said they had heard of the 4-H program.

"We've always thought the 4-H program was well known across the state," says Brad Cogdill, director of NDSU's Center for 4-H Youth Development. "The study results confirm this, and I'm pleased that 4-H has such high visibility."

The survey delved into three areas: how well is Extension known today, what is its potential to increase its relevance and how does it achieve that goal.

Forty-three percent of those surveyed in North Dakota have used Extension services. That compares with just 11 percent nationally.

"That is a significant difference, which shows the people of North Dakota value what Extension provides," Hauck says.

Respondents agreed that Extension provides relevant programs, such as teaching people how to better manage their finances and live healthier lives, helping youth develop leadership skills, teaching parenting and family communication skills, educating people on protecting the environment, teaching small-business owners and agricultural producers the skills they need to succeed, and educating homeowners about gardening and landscaping.

Sixty-four percent of those surveyed reported they are more likely to believe information if they know it comes from a reliable source, such as a major university, and 63 percent said they know they can rely on the state's universities for information and programs.

"What's even more important is that 68 percent of those surveyed said they would use Extension information and programs," Hauck says.

*For more information:*

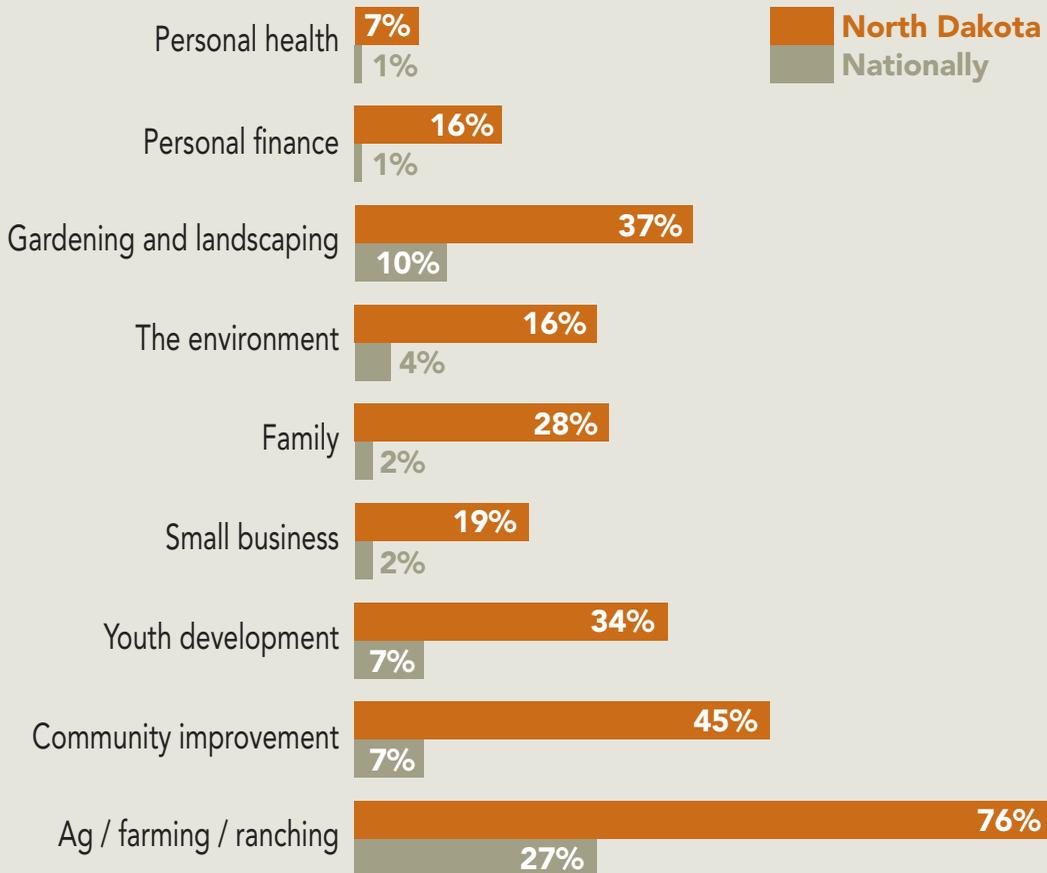
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## Use of Extension

(among people who have sought help in each area)



North Dakota's 10th Legislature authorized the Langdon center's creation in 1907. The following year, Langdon residents bought a quarter section (160 acres) of land and presented it to the state. Work began immediately on a barn, residence and seed house. The barn and residence still stand today. Agricultural production research on grasses and crops began during the 1909 growing season.

Under the leadership of its first director, Edward Stewart, the center began identifying opportunities for the region's farmers. One of those opportunities was durum because it was a little less susceptible to rust than bread wheat and it grew better in the cooler temperatures and shorter growing season typical to the region.

By the time Victor Sturlaugson became director in 1925, durum was established in the area, so plant breeders turned their attention to improving durum varieties for rust resistance, stiffer and shorter straw, a better amber color, higher yield and better milling quality.

During the 1970s and early 1980s, the center continued its efforts to develop traditional regional crops such as cereal grains, forages, grasses, legumes and horticultural plants, including potatoes, tomatoes and flowers. At the same time, the center expanded its research to include alternative crops adapted to the area's climate and oilseed crops such as rapeseed, which evolved into canola. Since then, canola has been a major crop in northeastern North Dakota.

In 1993, the center redirected its efforts to minimize the effects of fusarium head blight (scab) on cereal grains. In the late 1990s, the center became part of the statewide effort to better connect residents with the North Dakota University System to support an agriculturally based economy and economic development.

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# Centers Celebrate

NDSU's Hettinger and Langdon Research Extension Centers celebrated 100 years of service to North Dakota agriculture in 2009.

The Hettinger center was established in 1909 with a gift of 160 acres of land from Adams County residents and the city of Hettinger. The center's original work was to convert native prairie to farmland for research. Three years later, the center established 133 one-tenth-acre plots for large-scale research. The following year, the center bought 10 Guernsey cows, one Guernsey bull and one Jersey cow.

During the center's first 14 years, it expanded its research to include the evaluation of flax, prominent cereal varieties, forage, potatoes and corn crops, as well as resistance to rust in wheat.

In 1943, the state Legislature appropriated \$8,000 for the center to begin research in agronomy and sheep breeding. The center bought 20 Columbia ewes for a broad-scale project on sheep improvement through selection and breeding systems for conditions in North Dakota. The center later bought a group of Rambouillet ewes. These two flocks became the foundation for the center's current sheep program.

In addition to ewe and lamb feeding and reproductive management, today's research at the center focuses on calf backgrounding; beef cow management; agronomic issues such as fertilization, seed and pesticide application; land transfer issues related to the Conservation Reserve Program; and research with the National Forest Service on the Grand River National Grasslands south of Hettinger.

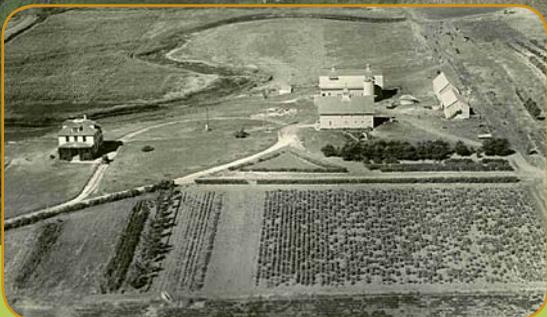
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Langdon REC 1912 (left) and today (above).

# Centennials



Hettinger REC 1924 (left) and 2007 (above).

North Dakota has  
**32,000**  
farms and ranches

North Dakota produces  
enough durum annually for  
**8.5 billion**  
servings of spaghetti

North Dakota produces  
enough wool in a year for  
**421,500**  
sweaters

North Dakota produces  
enough potatoes annually for  
**171 million**  
servings of french fries





## Research Extension Centers Provide **Learning Experiences**

More than 7,200 people attended field days, tours, demonstrations and other educational events at NDSU's Research Extension Centers in 2009.

Those events provided opportunities for people to:

- Learn about beef production techniques; cattle identification; range and nutrient management; forage production; water quality; grain variety trials; weed, insect and disease control; irrigation; energy-efficiency methods; and insurance
- Receive tips on growing flowers and vegetable gardens and using garden-fresh foods
- Take tours featuring new crop varieties, fertilization, herbicide application, fruit production and tile drainage
- Watch demonstrations on composting and no-till and strip-till farming
- Hear updates on oilseed crop development and bioenergy research

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The greenhouse complex will have  
**67,000**  
square feet of space  
when completed



## Greenhouse Facility Taking Shape

The west side of the NDSU campus is taking on a new look as work on the greenhouse facility progresses.

The North Dakota Legislature appropriated \$9 million three years ago and \$11.4 million during the last session for the project. NDSU will raise additional funds to complete the \$30 million project. Phase one is expected to be completed in mid-January 2010. Work has started on phase two and is targeted for completion in less than 18 months.

“The addition of the complex will put NDSU at the forefront of innovative research and technological research expertise,” says Ken Grafton, director of the North Dakota Agricultural Experiment Station and dean of the NDSU College of Agriculture, Food Systems, and Natural Resources.

Grafton says the successful completion of this facility will have an immediate impact on the state and region by:

- Enhancing student learning by enabling them to experience state-of-the-art technology and conditions
- Creating highly skilled professionals for the work force
- Attracting and retaining top-ranked scientists and educators involved in cutting-edge research and teaching
- Expanding research capabilities to benefit producers and businesses through increased productivity and sales

“The education and research carried out in this new complex will benefit producers and communities in the region by boosting production, increasing business activity, energizing communities and enhancing the global environment,” Grafton says.

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## Leadership Program Enhances Communities

A new NDSU Extension Service leadership development effort could lead to Jamestown gaining a community activity building and revitalizing its Civic Center.

The NDSU Extension Service's Rural Leadership North Dakota program held its first leadership short course in Jamestown in February and March 2009. Twenty people participated in the course, which consisted of four five-hour sessions.

As part of the course, participants began working on a project to benefit the community. Some chose to develop plans for attracting new events and more people to the Civic Center. Others opted to develop plans for a multipurpose activity center.

"It was so successful that we hope to offer the short course in other communities throughout the state," says Marie Hvidsten, RLND director.

Short course participants learned many of the same leadership skills taught during the two-year RLND program: developing effective communication skills; understanding individuals' behavioral styles; understanding and managing conflict; and identifying the seven types of community assets, or "capitals" (natural, cultural, human, social, political, financial and built).

RLND enables participants from farms, ranches and rural communities to become effective leaders with the ability to overcome challenges

facing rural North Dakota. They participate in eight in-state seminars and a six-day study tour to Washington, D.C. In 2009, RLND added an international seminar to Manitoba, where participants learned about Canadian agricultural, trade, water and cultural issues.

Each of the 14 members of RLND's class of 2007-09 also developed a project that benefits their community. Those projects include:

- Installing new playground equipment on the school playground in Ray
- Repairing and repainting homes of elderly and low-income residents in New Town
- Enhancing emergency services in Berthold
- Establishing a Key Club in Rolla
- Building a business center in Northwood
- Developing a community cooperative child-care facility in Stanley

The class of 2007-09 is among 55 people who have graduated from RLND since it began in 2003.

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# New Americans Improve Food Handling Practices

NDSU researchers and Extension faculty are helping new Americans learn how to handle food safely.

The project is the result of a \$569,000 U.S. Department of Agriculture grant to the NDSU Extension Service to study food handling practices among refugees and new Americans and create educational materials in several languages. In addition to NDSU research and Extension faculty, the research team includes collaborators from the University of Minnesota, a tribal college and public health agencies.

Culture, language, literacy, time, cost and limited resources can be significant barriers preventing new Americans from adopting safe food handling practices, the team has learned. The team also has found other barriers, including distance to acceptable food markets, transportation to these markets and new Americans confusing food safety with food and its relationship to chronic diseases.

The team has held focus groups with refugees and new Americans from Bosnia, Kurdistan, Liberia, Somalia and Sudan to determine their perceptions of food safety and preferred methods of learning about handling food safely. The team also has developed a food safety survey for those five groups, which are the most common new Americans in North Dakota.

As a result, the team developed a series of hands-on lessons focusing on three main areas: chilling leftovers correctly, thawing frozen meat, and safe temperatures for serving and eating food containing meat. In addition, the team developed videos and a Web site with food safety information in 24 languages.

“This project has the potential to be a model program in food safety education for diverse populations,” says NDSU Extension food and nutrition specialist Julie Garden-Robinson, one of the project’s directors.

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A number of different methods have been developed to measure soil nutrient availability through the years. Ron Wiederholt, NDSU Carrington Research Extension Center nutrient management specialist, is using Plant Root Simulator probes to track the nutrient mineralization of manure.

“Research has shown that livestock manure is comparable to commercial fertilizer as a nitrogen source for crop production,” Wiederholt says. “With the high price of commercial nitrogen, livestock manure is becoming a more attractive source. However, crop producers sometimes are reluctant to fully credit the nitrogen in manure.”

The Plant Root Simulator probe helps researchers, such as Wiederholt, see the soil from a plant’s perspective. The device simplifies the collection and analysis of soil samples to track nutrient mineralization.

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## NDSU Tries New Ways to Track Manure Nitrogen Release



# NDSU Researchers Help Save Endangered Plant

NDSU Entomology professor Marion Harris is trying to save the Western prairie fringed orchid.

It was listed as a threatened species under the Endangered Species Act in 1989. North Dakota, Minnesota and Manitoba have the only remaining large populations of the orchid. It grows in just one location in North Dakota — the Sheyenne National Grasslands.

With assistance from the U.S. Forest Service, U.S. Fish and Wildlife Service, The Nature Conservancy, the Chicago Botanic Garden, and other NDSU faculty and graduate students, Harris has determined the degree to which the orchid depends on insects for pollination and which insect species serve as pollinators.

“It appears that the orchid relies almost entirely on night-flying hawkmoths for seed production,” she says. “As seed are the primary way of recruiting new members for orchid populations, understanding insect pollinators will contribute to recovery plans for the orchid.”

To prove that a particular insect species is a pollinator, the researchers enclosed an orchid plant in a net cage before flowering to exclude pollinators. When the plant started flowering, they introduced a moth into the cage for one or two nights. Then they removed the moth and collected data from the flowers on pollen removal and

placement. They re-covered the plant and checked it in September for seed pod production.

Harris has found that at least five hawkmoth species contribute to outcrossing pollination, which is transferring pollen from one plant to another. A different group of moths contributes to pollination through inbreeding, or transferring pollen from one flower to another on the same plant. One of the five hawkmoths contributing to outcrossing is commonly known as the spurge hawkmoth. It is a native of Europe and was introduced into western North Dakota in 1963 as a biocontrol agent for leafy spurge, one of the state’s most difficult-to-control noxious weeds.

“We now know that the spurge moth provides a second ecological service by pollinating the Western prairie fringed orchid,” Harris says.

The second most important pollinator is the hermit sphinx, a species native to North Dakota. It also is a pollinator for the Eastern prairie fringed orchid, another species that is listed as threatened. Its numbers are so low in Illinois that volunteers and scientists from the Chicago Botanic Garden assist the hawkmoth pollinators by pollinating some of the orchids by hand.

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The Western prairie fringed orchid grows in just

**7** states and **1** Canadian province

# 4-H National Youth Science Day a Blast



Youth from across North Dakota joined 6 million 4-H'ers nationwide who participated in the 4-H National Youth Science Day events.

4-H National Youth Science Day, which focuses on 4-H's efforts to ignite youths' interest in science, engineering and technology, was a highlight of the 2009 National 4-H Week celebration.

4-H's goal is to engage 1 million more youths in science, engineering and technology programs by 2013 to combat a national shortage of young people pursuing college majors and careers in science. More than 5 million youths across the nation already take part in yearlong 4-H science, engineering and technology programming.

As part of the 2009 4-H National Youth Science Day, youths were involved in a national science experiment titled "Biofuels Blast." It taught participants how cellulose and sugars in crops such as corn and sorghum, as well as in switchgrass and algae, can be converted into fuel and how alternative energy sources can be used in their communities.

"Our hope is that 4-H National Youth Science Day will make science fun and spark interest in learning more about cutting-edge technology," says Linda Hauge, an NDSU 4-H youth development specialist.

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About  
**2,500**  
North Dakota youth participated  
in the 4-H National Youth  
Science Day experiment





## Tile Drainage

# Reduces Production Risk

From the 1990s through 2009, excess water has impacted crop production significantly, especially in eastern North Dakota. Along with acres not seeded because of excess moisture, some acres were planted late, which caused yield losses.

As part of the solution, several NDSU Extension specialists and staff have established a tile drainage research site. Agronomist Hans Kandel is leading the Extension team and collaborating with Extension specialists Tom Scherer, Joel Ransom, Sam Markell and Marcia McMullen.

“This is a unique site because it is the only replicated research site in a multistate region comparing tilled and nontilled crops,” Kandel says. “In addition to measuring yield, plants are evaluated for disease and other growth characteristics.”

Plant pathologists are evaluating the effect of better drainage on plant diseases. Soil scientists are monitoring the changes in the soil, and agronomists are studying the growth, development and yield of different crops.

Kandel says the technical and economic feasibility must be understood clearly before tile drainage will become a widely accepted water management practice in the region.

“Tile drainage can help establish more optimum conditions for field operations and crop growth by lowering the water table in poorly drained soils,” Kandel says.

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Production agriculture  
accounts for about

25 percent

of North Dakota's economic base

## New Crop Varieties Help Build Profits

Working collaboratively, the North Dakota Agricultural Experiment Station, Research Extension Centers across the state, Main Station in Fargo and various NDSU departments continue to develop new crop varieties.

New varieties released in 2009 include:

- Barlow hard red spring wheat
- Mott hard red spring wheat
- Ashtabula conventional soybean
- Rockford white-hulled oat

"Developing new varieties improves efficiency and benefits the state's economy," says Ken Grafton, director of the North Dakota Agricultural Experiment Station and dean of the NDSU College of Agriculture, Food Systems, and Natural Resources. "Developing new varieties also gives our producers more opportunities to compete in a global market."

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## Agent-in-training Program **Builds Success**

Marty Fear has a big interest in 4-H and livestock, so when he saw an ad on the Internet for an Extension Service agent-in-training position, he applied. He got the job and since February has been an agent-in-training at the Walsh County office.

The agent-in-training program is designed to help new agents be competent in a number of subject matters prior to taking over as a full-fledged Extension agent. Fear, a native of Sutherland, Neb., will work in Walsh County as an agent-in-training for up to a year before applying for his own county.

"I'm really interested in livestock, so my hope is that I get a county that has a lot of livestock," Fear says. "So far, I'm really enjoying working in North Dakota and with the agent-in-training program. It's nice to have a mentor and be able to ask questions or have him steer me in the right direction."

Longtime Extension agent Brad Brummond is Fear's mentor. Brummond has worked with several people who have gone through the agent-in-training program and has enjoyed working with them all.

"While I'm charged with training, they also open my eyes to new ideas and ways of doing things, so the educational process flows two ways," Brummond says. "I find Marty's out-of-state views a refreshing change from my way of looking at things after 27 years in the NDSU Extension Service."

Fear says he has enjoyed working with Brummond and gaining a better understanding of how Extension programs work, which he says is knowledge he would not have gained without the agent-in-training program.

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# NDSU Offers Expertise to Manufacturers

North Dakota manufacturers have improved access to NDSU's faculty, research and technology. To open the door to NDSU's expertise, the NDSU Extension Service has added a manufacturing specialist position in the Extension Center for Community Vitality.

"NDSU is partnering with North Dakota businesses to facilitate the transfer of knowledge and technology between NDSU and the state's manufacturing resources," says David Lehman, who was hired to fill the position. "The ultimate goal of this endeavor is to identify and address manufacturers' needs, which will lead to an increase in economic development across the state."

Lehman, who is based at NDSU's Dickinson Research Extension Center. He also is a staff member of NDSU's College of Engineering and Architecture. His Extension role includes:

- Gathering information on energy-efficient manufacturing operations to help small and medium-sized North Dakota companies lower their operating costs and reduce their environmental footprint
- Letting manufacturers know NDSU's expertise is available to them
- Identifying common concerns among North Dakota manufacturers
- Working with entrepreneurs with a manufacturable product to develop or expand a business
- Helping companies implement ISO (International Organization for Standardization) standards
- Connecting manufacturers to NDSU resources to develop water quality technology
- Identifying projects for potential NDSU Capstone (a program that requires students to apply the knowledge they've gained), senior engineering design or faculty outreach projects
- Working to get NDSU's Bison BEST (Boosting Engineering, Science and Technology) robotics program started in junior and senior high schools

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## Researchers Follow Climate Change Clues

A lake in south-central North Dakota could help researchers discover the climate mechanisms that trigger drought and other climate changes.

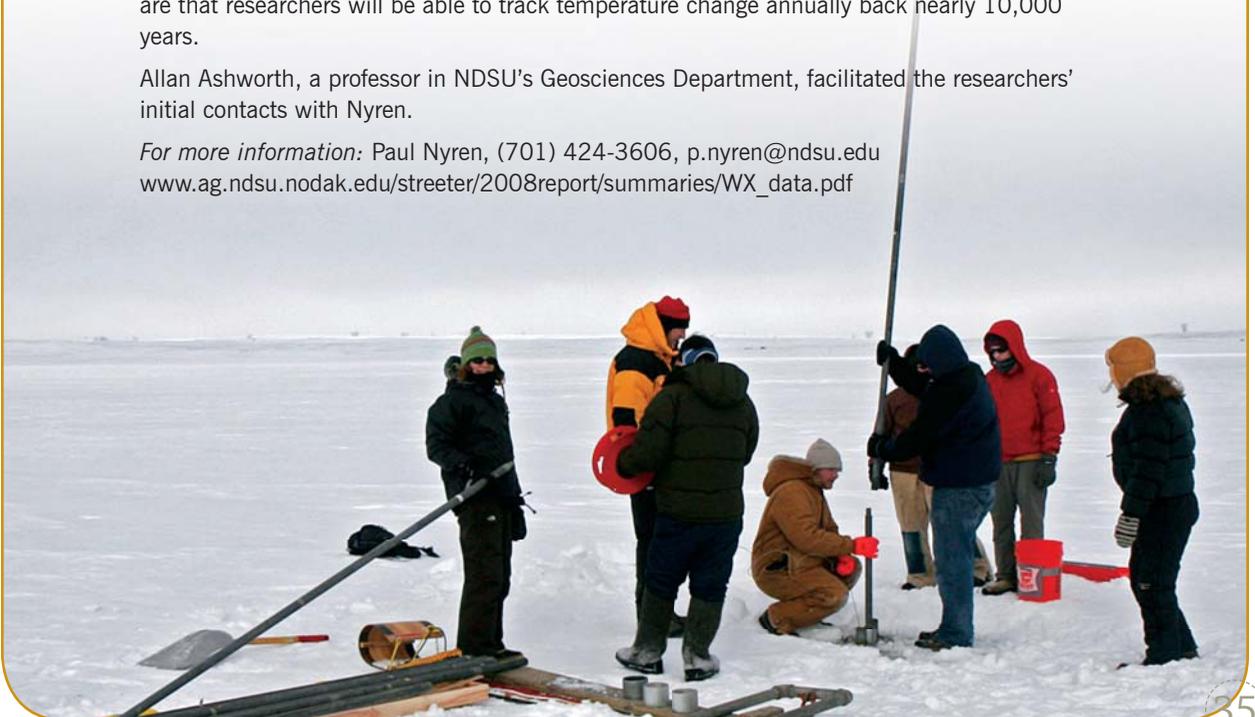
Paul Nyren, director of NDSU's Central Grasslands Research Extension Center near Streeter, teamed up with Sheri Fritz, a researcher from the University of Nebraska; Jaime Toney, a graduate student from Rhode Island's Brown University; Paul Baker, a researcher from North Carolina's Duke University; and Eric Grimm, a researcher from the Illinois State Museum, to collect water samples from nearby Lake George, also known as Salt Lake. They took samples from the surface and various depths during summer 2008. In February 2009, Nyren helped the researchers take sediment samples from the bottom of the ice-covered lake.

The lake contains algae that produce organic compounds known as alkenones, which scientists use as biomarkers to reconstruct climate variables such as temperature and precipitation.

DNA testing indicates the lake has the same type of algae found in Antarctica's Ace Lake. The researchers also found that cold conditions coupled with high concentrations of sodium and sulfate, like those in Lake George, result in high concentrations of alkenones. Early indications are that researchers will be able to track temperature change annually back nearly 10,000 years.

Allan Ashworth, a professor in NDSU's Geosciences Department, facilitated the researchers' initial contacts with Nyren.

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[www.ag.ndsu.nodak.edu/streeter/2008report/summaries/WX\\_data.pdf](http://www.ag.ndsu.nodak.edu/streeter/2008report/summaries/WX_data.pdf)



Parent Resource Centers

# Lead on School Readiness

The North Dakota Parent Education Network consists of linked Parent Resource Centers in the state that either are associated with or partner with the NDSU Extension Service. In their efforts to serve children and families throughout the state, the centers provide preventive education, parent support groups, resource lending libraries and dissemination of educational materials.

During the last three years, this network of Parent Resource Centers has taken a lead role in furthering school readiness in North Dakota.

Nearly 47,000 North Dakota children between ages 0 and 5 are preparing for their entry into school, and need to gain knowledge and skills for success. This transition often is just as important a change for parents as it is for children. During the 2008-09 school year, Parent Resource Centers in Dickinson, Williston, Fargo, Mandan and Minot coordinated and led the Gearing Up for Kindergarten parent education and school readiness program at 18 sites with 290 families enrolled.

“The academic and social expectations for children entering kindergarten have changed a great deal from previous generations,” says Sean Brotherson, NDSU Extension family life specialist. “Parents are a child’s first and best teachers, and our Parent Resource Centers are leading in a major way in supporting parents in their role of preparing their children for success in school.”

The Parent Resource Centers have partnered with the United Way, North Dakota Parent Information Resource Center, Head Start, local school districts and child-care programs to operate the Gearing Up for Kindergarten program.

“Through their efforts, they are instilling knowledge and self-confidence in children, giving parents the tools and understanding they need, and helping to prepare a new generation for school learning and success,” Brotherson says.

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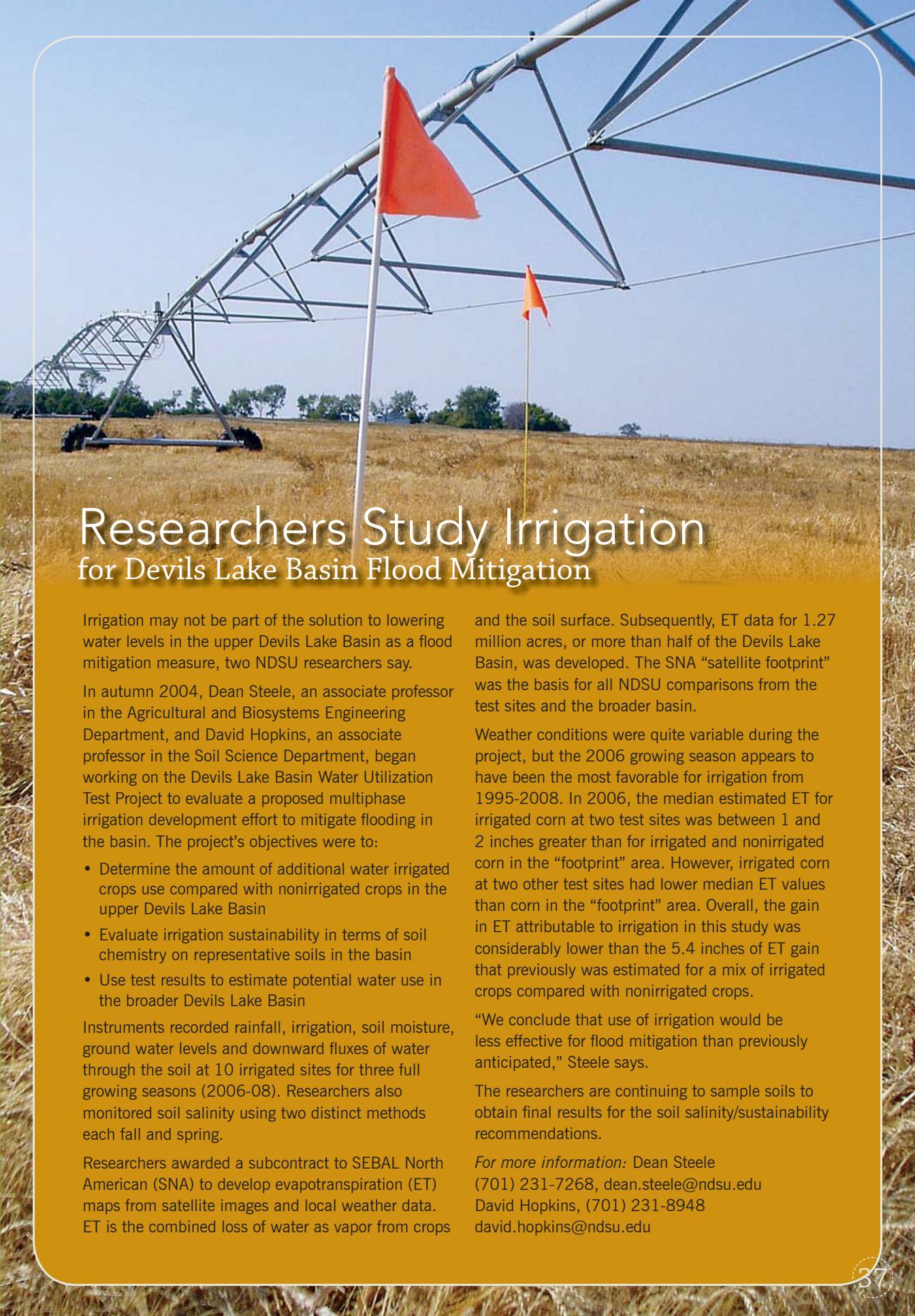
[www.ag.ndsu.edu/family/resources.htm](http://www.ag.ndsu.edu/family/resources.htm)



During the 2008-09 school year,

# 290

families enrolled in  
Gearing Up for Kindergarten



# Researchers Study Irrigation for Devils Lake Basin Flood Mitigation

Irrigation may not be part of the solution to lowering water levels in the upper Devils Lake Basin as a flood mitigation measure, two NDSU researchers say.

In autumn 2004, Dean Steele, an associate professor in the Agricultural and Biosystems Engineering Department, and David Hopkins, an associate professor in the Soil Science Department, began working on the Devils Lake Basin Water Utilization Test Project to evaluate a proposed multiphase irrigation development effort to mitigate flooding in the basin. The project's objectives were to:

- Determine the amount of additional water irrigated crops use compared with nonirrigated crops in the upper Devils Lake Basin
- Evaluate irrigation sustainability in terms of soil chemistry on representative soils in the basin
- Use test results to estimate potential water use in the broader Devils Lake Basin

Instruments recorded rainfall, irrigation, soil moisture, ground water levels and downward fluxes of water through the soil at 10 irrigated sites for three full growing seasons (2006-08). Researchers also monitored soil salinity using two distinct methods each fall and spring.

Researchers awarded a subcontract to SEBAL North American (SNA) to develop evapotranspiration (ET) maps from satellite images and local weather data. ET is the combined loss of water as vapor from crops

and the soil surface. Subsequently, ET data for 1.27 million acres, or more than half of the Devils Lake Basin, was developed. The SNA "satellite footprint" was the basis for all NDSU comparisons from the test sites and the broader basin.

Weather conditions were quite variable during the project, but the 2006 growing season appears to have been the most favorable for irrigation from 1995-2008. In 2006, the median estimated ET for irrigated corn at two test sites was between 1 and 2 inches greater than for irrigated and nonirrigated corn in the "footprint" area. However, irrigated corn at two other test sites had lower median ET values than corn in the "footprint" area. Overall, the gain in ET attributable to irrigation in this study was considerably lower than the 5.4 inches of ET gain that previously was estimated for a mix of irrigated crops compared with nonirrigated crops.

"We conclude that use of irrigation would be less effective for flood mitigation than previously anticipated," Steele says.

The researchers are continuing to sample soils to obtain final results for the soil salinity/sustainability recommendations.

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NDSU President Joseph A. Chapman and his wife, Gale, along with faculty, staff and Extension Service leaders, traveled part of the state in June for a Conversations Across the Land tour.

“Since the university’s founding in 1890, there has been a special relationship between NDSU and the people of North Dakota,” Chapman says. “This tour continues this great tradition.”

The Conversations Across the Land tour stopped at Grand Forks, Bottineau and Rugby on June 16 and Langdon on June 17.

Hosts for each event consisted of NDSU alumni and community leaders. These hosts also helped plan the events.

A highlight of the tour was the stop at the Langdon Research Extension Center, where Chapman helped the Langdon REC celebrate its centennial. Chapman talked about the center’s 100 years of excellence.

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## Chapman Leads Conversations Across the Land Tour





# Community Improvements on the Horizon

Residents of 15 North Dakota communities spent the past year learning ways to reduce poverty, population loss and economic decline with assistance from the Horizons program.

Horizons is a partnership between the NDSU Extension Service, which facilitates the program, and the St. Paul, Minn.-based Northwest Area Foundation, which provides funding.

About 440 people from Dunseith, Fessenden, Fordville, Fort Yates, Hannaford, Lakota, Leeds, McClusky, Marion, Minnewaukan, Napoleon, Rolla, Sheldon, Tolna and Underwood participated in Horizons community conversations in fall 2008. Those community conversations helped residents explore their perceptions about poverty and develop plans to improve their community. About 310 residents completed a

leadership development course as part of the Horizons program.

Here are some ways communities have benefited from Horizons:

- Fort Yates developed a community garden and started a farmers market to provide educational sessions on various topics and help entrepreneurs in the region showcase their products.
- Lakota started a community garden and is developing a community shed with items such as lawnmowers, tools and dishes that people can check out similar to library books.
- Underwood developed a housing incentive that makes lots available for \$1 if building occurs within a specific time.
- Rolla and Underwood created social networking groups or social information hubs that help people who are in need of assistance or are new to town to make them feel welcome.

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[www.northdakota.communityblogs.us](http://www.northdakota.communityblogs.us)

About  
**310**  
residents completed a leadership  
development course as  
part of the Horizons program

## Heritage Tour Promotes **Economic Activity**

Band leader and musician Lawrence Welk's Strasburg homestead, NDSU's Central Grasslands Research Extension Center near Streeter and several North Dakota churches were among stops on the first Dakota Memories Heritage bus tour in September 2009.

The three-day tour focused on sites of historical significance for Germans from Russia in south-central North Dakota and the importance of heritage-based tourism. Michael Miller, Germans from Russia Heritage Collection director, hosted the tour, and the NDSU Extension Service and Extension Center for Community Vitality helped sponsor it.

"Participants learned how to identify local unique cultural assets and experience how to use those assets to increase local economic activity," says Kathleen Tweeten, director of the Center for Community Vitality.

Participants also dined on ethnic food, such as strudel, borscht, kuchen, knoephla soup and homemade sausage, and heard presentations from Allan Ashworth, an NDSU Distinguished Professor in the Geosciences Department; Tom Isern, an NDSU Distinguished Professor in the History, Philosophy and Religious Studies Department; Jessica Clark, Dakota Memories coordinator; and Bob Dambach, director of television at Prairie Public Broadcasting.

"For some people, this was their first introduction to the heritage and culture of the Germans from Russia," Miller says.

The tour attracted people of various ethnic backgrounds from the Dakotas, Minnesota, California, Iowa and Alberta, Canada.

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<http://library.ndsu.edu/grhc/dakotamemories/heritage/index.html>





## Additions Strengthen Research Extension Centers

NDSU officials cut ribbons in 2009 to celebrate the completion of expansion projects at two Research Extension Centers.

The Carrington Research Extension Center added 3,800 square feet of space to its headquarters facility. The addition includes six offices, a room for videoconferencing and computer-based instruction, a conference room and storage for educational equipment.

Center Director Blaine Schatz says the expansion allows the center to use technology that didn't exist when the facility was built, as well as make room for staff who were housed in other buildings not suited for joint research and Extension programming.

A 1,400-square-foot addition to the Hettinger Research Extension Center complex provides room for eight offices.

The expansion allows the center to offer programming for producers and others in the region by providing more work space for additional scientists and post-doctoral and graduate students, according to Chris Schauer, center director.

Nearly  
**24 percent**

of North Dakota workers are farmers or ranchers or are in farm-related jobs

*For more information:*

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# NDSU Helps Create Chromosome Maps

Genome sequences provide the most detailed view of an organism's parts. This information is critical to developing a comprehensive approach to help alleviate disease or improve crop plants. For instance, human genome sequencing has revolutionized modern medicine and how drugs that target a specific ailment are produced.

Genome sequencing has revolutionized crop improvement strategies of rice, sorghum and maize. Soybeans soon will be added to this list. The wheat genome is large, measuring six times that of human or maize genomes, requiring the development of new approaches to prepare this genome for complete sequencing because current strategies are cost-prohibitive.

A team of researchers led by Shahryar Kianian, NDSU Department of Plant Sciences, was awarded funding by the National Science Foundation – Plant Genome Research Program to use high-resolution radiation hybrid mapping to prepare the wheat D-genome (one of the three genomes present in spring wheat) for complete sequencing.

Other team members are from Oregon State University, the University of California at Davis, U.S. Department of Agriculture's Agricultural Research Service and Department of Computer Sciences at NDSU.

Although radiation has been used widely in plants for creating mutations and transfer of genes from related species, this approach has not been widely used for mapping.

This team has reported the development of the first high-resolution radiation hybrid map of a plant chromosome. In this approach, radiation is used to break wheat chromosomes and create a panel that then can be used to map genes based on their presence or absence. If two genes are physically close to each other, they tend to be retained or broken together, as opposed to genes that are physically far apart. In this manner, a map of the genome is created that is similar to a detailed map of the Earth.

"This map can then be used as a guide to sequencing the genome," Kianian says. "The tools, methods and knowledge developed in this project can be applied to other crop species and will facilitate the construction of high-resolution maps at a fraction of the cost of current methods.

"These maps will provide easy access to genes of scientific and agricultural importance and the development of new strategies to manipulate crop plants to better serve the needs of a growing world population," he adds. "Considering the costs associated with this approach, genomes of many neglected plant species with great scientific and agricultural value will easily be characterized at a high resolution."

*For more information:*

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North Dakota produces  
enough wheat in a year for

15.5 billion

loaves of bread

## NDSU Sponsors Energy Auditor Training

The NDSU Extension Service teamed up with the Kansas Building Science Institute in July 2009 to provide a comprehensive energy auditor training program in Fargo.

During the five-day program, the 14 attendees from three states learned how to help homeowners assess how much energy their home uses and evaluate what measures they can take to improve their home's energy efficiency.

The program was geared toward builders, insulating contractors, remodelers, home inspectors, utility service providers or anyone else with some building experience and an interest in increasing their knowledge of home energy diagnostics. This course was the first step in becoming a certified home energy rater.

Some recent developments made this a timely program, according to Carl Pedersen, NDSU Extension energy educator. For example, a new state law that requires energy conservation standards to become part of the state building code has the potential to increase the need for energy auditors to ensure compliance with the standards. Expected rises in energy prices also could increase the market for home energy auditors and raters.

The North Dakota Department of Commerce's Office of Renewable Energy and Energy Efficiency helped support the training program.

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## North Dakota State University

### Agriculture and University Extension at North Dakota State University

The North Dakota Agricultural Experiment Station consists of seven Research Extension Centers placed strategically throughout the state and the Main Station in Fargo. We work to develop techniques and technologies to enhance the production and use of food, feed, fiber and fuel from crop and livestock enterprises.

The NDSU Extension Service provides the people of North Dakota with the research-based information they need to succeed in today's increasingly complex world and be prepared for the future. We have offices serving all of North Dakota's 53 counties and Fort Berthold.

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

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