

2011 North Dakota State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Agriculture is the dominant force in North Dakota's economy, accounting for 30% or \$26 billion of total business activity. To assist with agriculture's continued success, the North Dakota Agricultural Experiment Station (ND AES) and NDSU Extension Service serve as major sources for innovation, new tools and knowledge, and educational support. The following examples illustrate recent contributions in the areas of global food security, climate change, sustainable energy, food safety, childhood obesity, and citizen and leadership development.

Global Food Security

Work continues to develop and release new crop varieties to increase producer profits through research and testing by the North Dakota Agricultural Experiment Station, Research Extension Centers across the state, Main Experiment Station in Fargo and various NDSU departments. In 2011, Prosper hard red spring wheat was a joint release by the North Dakota Agricultural Experiment Station and Minnesota Agricultural Experiment Station. It is a conventional to semidwarf variety with an early to medium-early maturity. Prosper has a very high yield that equals or betters Faller. The North Dakota Agricultural Experiment Station also released Newburg oats in 2011. Newburg has excellent yield potential. "Developing new varieties to improve yields, fight disease or overcome various weather conditions will benefit producers and the state's economy," says Richard Horsley, NDSU Plant Sciences chair.

What started as research on rapeseed in an effort to discover new profitable crops for North Dakota has culminated in canola being widely accepted as a crop with about 1 million acres grown annually. Ongoing canola research at the NDSU Langdon Research Extension Center, other RECs and the Main Station in Fargo is providing North Dakota farmers with the expertise to grow canola profitably. "This program is a shining example of how NDSU research and Extension, working together, can make huge impacts on our state's producers," says Randy Mehlhoff, Langdon REC director.

Barley is a competitively priced grain that could replace high-cost corn as the primary energy source in feedlot rations, NDSU research shows. Carrington REC animal scientist Vern Anderson has been studying the effects of feeding barley in combination with distillers grains in growing and finishing diets. "Fast-growing steers will benefit from the addition of distillers grain, which is a source of bypass (rumen undegradable) protein," states Anderson. In a growing study, Anderson found that feed intake was greater with any level of distillers grain included in the diet. Gains averaged 0.32 pound per day more for calves receiving distillers grain than those fed a diet without it. In finishing steers, distillers grains treatments also resulted in increases in hot carcass weight, dressing percent, fat thickness, marbling score and USDA yield grade.

Climate Change

Flooding in 2011 once again put the NDSU Extension Service at the forefront of the state's disaster preparation and recovery efforts as every watershed in the state was affected. "Our initial efforts were to provide resources related to proper sandbagging, dike construction, evacuation preparedness, sump pumps, floor drains, children, stress and emotional health to all the sandbagging sites," says Burleigh County Extension agent Megan Myrdal. New technology was a vital link in reaching people. Agents posted

information on Facebook. Extension added an Ask an Expert feature to NDSU's flood website to allow people to ask questions about flood-related issues day or night. Extension specialists created flood cleanup videos, which were posted on the website, and collaborated with counterparts at the University of Minnesota Extension to develop a free online resource called Recovery After Disaster: The Family Financial Toolkit. Extension also helped create Disaster Recovery Log, a smartphone application that lets users record information about damages in their flooded homes using text, images and audio, as well as access NDSU flood recovery information.

The NDAES and NDSU Extension Service are moving forward on an initiative that focuses on alleviating soil-related problems. "The initiative includes salinity and sodicity problems and fertility management, as well as addressing ways for landowners to manage their land resources for agricultural, recreational and wildlife needs," says Ken Grafton, Agricultural Affairs vice president. Saline and sodic soils affect approximately 12.6 million acres of agricultural land in North Dakota. As part of the solution, several NDSU Extension specialists and staff have established a tile drainage research site. Tile drainage will lower the water table so water can move downward through the profile to lower the salt level at the root zone. Other research scientists are looking at other soil health issues including the quality of sediment after a flood, different methods of evaluating soil salinity in fields and possible byproducts that could be used as fertilizers.

The North Dakota Agricultural Weather Network (NDAWN) has assisted many North Dakota growers in making weather-critical decisions concerning their crops, livestock and livelihood. The network provides weather data, which is instrumental in developing various agricultural models, such as late blight, degree day and growth stage, for barley, corn, canola, potatoes, sugar beets, sunflowers, wheat and other small grains. NDAWN users also can monitor irrigation scheduling, crop water use, sugar beet root maggots and insect development. For example, sugar beet growers in the Red River Valley utilize NDAWN data for several applications that are designed to inform growers of the existing environmental conditions and to help target the optimum timing for herbicide, insecticide and fungicide applications. "If growers can eliminate one fungicide application from their cercospora program, they have the potential to save \$9 million annually," says Adnan Akyuz, NDAWN director and state climatologist.

Sustainable Energy

After years of research by NDSU's Agribusiness and Applied Economics Department and the Green Vision Group, energy beets have been grown successfully in seven yield plots across the state. "Gross returns per acre for energy beets approach \$893, compared with \$386 for corn and \$292 for soybeans," says Cole Gustafson, who leads the project. "Also, adaptability, drought resistance and twice as much ethanol production per acre compared with corn make energy beets a lucrative feedstock alternative to corn ethanol." The project has just completed phase one, which evaluated the initial project feasibility and agronomic potential of raising beets in nontraditional regions. Phase two of the project will expand yield trials to additional regions, develop front-end processing technology for the processing plants, evaluate the potential for storing and processing beets throughout the year, and obtain a new federal crop insurance program for energy beets. The construction of a commercial plant will begin with phase three in 2013. Economic projections show an additional \$380 million in added farm production will flow through the state annually when the projected 12 plants are operational.

Homeowners hoping to cut their energy bills and save energy resources are getting some help from the NDSU Extension Service. Home energy video clips that Extension posted on YouTube in summer 2011 have had nearly 1,700 views. The clips, each focusing on a different aspect of home energy use, are part of Extension's Home Energy 101, a free online course. The course, based on NDSU Extension's publication "Top Ten Home Energy Checklist," includes information about energy use, interviews with home energy experts who offer real-life examples of energy wasted in homes, and tips and techniques for reducing energy loss. "Buildings use 71 percent of the electricity produced and almost 50 percent of all energy consumed in the U.S.," says Extension energy educator Carl Pedersen, who developed Home Energy 101.

Food Safety

Bacteria can cause serious health problems in humans sometimes can lead to deadly foodborne illness. NDSU researchers are trying to find ways to combat collections of bacteria, called bacterial biofilms. "The information that will be obtained from the research will constitute a major breakthrough in our understanding of the physiology that underlies biofilm formation and will have implications in several biofilm-associated problems and/or applications," assistant professor Birgit Pruess says. While studying a pathogenic *E. coli* strain grown on meat surfaces, Pruess and Ph.D. student Preeti Sule found that eliminating flagella increased the bacteria's biofilm-forming ability, cell division rate and pathogenicity, or ability to produce an infectious disease in an organism. These findings will open countless avenues to develop novel meat treatments.

Becoming immersed in a new culture and living conditions can be difficult. To ease that transition, the NDSU Extension Service has developed resources in a number of languages to help new Americans deal with one aspect of their new lives: how to handle unfamiliar foods safely. "As North Dakota communities grow in ethnic diversity, we have seen a need to develop resources and training for new Americans," says Julie Garden-Robinson, NDSU Extension food and nutrition specialist. Extension's food safety materials include videos on food safety in the home in Arabic, Bosnian, Kurdish and Somali, and flipbooks with tips on keeping food safe in Arabic, Bosnian, Kurdish, Nepali, Somali and Spanish.

Childhood Obesity

Dry edible beans, an abundant crop in North Dakota, may help reduce childhood obesity. To educate parents about the health benefits of dry edible beans and increase children's knowledge of gardening, the NDSU Extension Service developed Spillin' the Beans About Beans, a four-lesson curriculum. Forty-seven families with children participated in the program launched in the spring of 2011. The preschoolers sprouted beans in gardens, participated in art projects and heard stories about beans. The children and their parents tasted and rated 10 recipes containing beans. Parents received a weekly newsletter with information on the health benefits of beans, activities to do with their children and bean preparation, plus recipes of the sampled dishes. "Gardening and other hands-on activities have been shown to be excellent methods to promote changes in children's diets, especially as a means of improving vegetable consumption," says Julie Garden-Robinson, NDSU Extension food and nutrition specialist. Other program results included parents increased their awareness of the link between beans and blood sugar management in diabetics and families significantly increased their use of canned beans. This program is part of the Common Bean Coordinated Agricultural Project, a multistate effort involving bean breeders and other researchers at several universities, including NDSU, and U.S. Department of Agriculture centers.

Citizenship and Leadership Development

New businesses, additional housing, increased tourism, and more recreational and educational opportunities are some of the benefits the Horizons program brought to North Dakota's rural communities. Forty-six rural North Dakota communities participated in Horizons, an 18-month program launched in the state in 2003. The program provided education, coaching and activities to build strong leadership to help communities address challenges such as poverty, economic decline and population loss. It was the result of a partnership between the NDSU Extension Service and St. Paul, Minn.-based Northwest Area Foundation. A few of the program's major impacts in North Dakota include communities acquiring more than \$2.4 million in grants; three closed rural schools have been converted to businesses, business incubators, lodging facilities or fitness Centers; tourism expanded in 13 communities; and several communities developed community gardens and farmers markets to provide residents with fresh fruits and vegetables.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	61.0	0.0	50.7	0.0
Actual	52.8	0.0	71.1	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- Combined External and Internal University Panel
- Expert Peer Review

2. Brief Explanation

Research programs were subjected to reviews prior to, during and at the conclusion of each research project. Research faculty who participate in multi state research projects received a critical review of their contributing project from fellow committee members, the administrative adviser and the North Central Multi State Research Committee. Many faculty have competitive grants which are awarded on the basis of scientific merit and have an external peer review. Each research faculty member with the North Dakota Agricultural Experiment Station was required to have a station project that was reviewed for scientific merit by a Project Review Committee that is comprised of one faculty member from each discipline. All research was peer reviewed, either internally or externally, prior to publication.

Programs of state Extension specialists are evaluated within their home departments and by program leaders. Programs of area Extension specialists are evaluated by their Research Extension Center directors and by program leaders. Multiple specialists receive federal, state, agency or commodity competitive funding for projects which involves external reviews. Several specialists also convene formal advisory boards which includes program evaluations. All Extension bulletins are peer reviewed internally and external reviewers are frequently solicited.

Reviewed publications are not a required performance expectation of county agents, but they are co-authors on some specialist bulletins and are then internally peer reviewed. Impact reports of county agents are reviewed by their district director and the appropriate program leader.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals

- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Other (input from State Board of Agricultural Research and Education)

Brief explanation.

Establishing linkages with the public enables us to discover information about community/county/district/state assets and needs. Methods such as holding public meetings or listening sessions, using targeted invitations, and surveys are used for stakeholder input on an on going basis. Using several methods to collect data ensure that high priority issues are identified, people that have a self interest in the issue are brought to the planning meetings, and an educational design is developed to address the issue using a variety of delivery methods. A tool that is being used more extensively is the Turning Point technology. It has been used in the classroom for some time, but has a great utilization for the public to express their concerns anonymously in public forums or gatherings.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

The State Board for Agricultural Research and Education (SBARE) is charged with determining the causes of any adverse economic impacts on crops and livestock produced in this state; developing ongoing strategies for the provision of research solutions to negate adverse economic impacts on crops and livestock produced in this state; developing ongoing strategies for the dissemination of research information through the Extension Service; annually evaluating the results of research and extension activities and expenditures; and reporting the findings to the North Dakota Legislative Council and the State Board of Higher Education.

County commissioners actively participate in county extension program reviews. The county extension budgeting process also results in strong engagement from county government.

The North Dakota Department of Human Services and NDSU Extension Service formed a statewide Family Life Education Committee. The committee is composed of state legislators, an Extension specialist, an Extension Human Development Agent, citizens with a parenting self interest, two administrators from the Child Division of the State Department of Human Services and the Extension Assistant Director, Nutrition, Youth and Family Science. As a result of this partnership, the state Department of Human Services provides funding opportunities to six state family life education centers through a request for proposal process. The availability of designated funds also directs the focus of the parenting education programs provided through the six family life education center coordinators.

The ND Department of Health, under the direction of the Governor of North Dakota, formed an

alliance of organizations in ND that provide significant support and leadership for health related initiatives. NDSU Extension is represented on this coalition. Networking among these professionals is invaluable, in addition to the legislative work.

A number of government and non governmental units have formed a coalition to address the financial needs of North Dakotans. Saving more and reducing credit card debt are two of the key issues being addressed. NDSU Extension is a part of the team.

The Rural Leadership ND Council serves as a stakeholder advisory board of agricultural, business, public, and non-profit entities to provide program review and assessment of current needs related to rural community development issues. Council membership is based on a nomination process.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals

Brief explanation.

The State Board for Agricultural Research and Education (SBARE) meets bimonthly. Both the Extension Service and the Experiment Station are represented on the board, affording opportunities for input and program directions.

County commissioners are met with at least once a year and in most cases twice for input.

The statewide Family Life Education Committee meets quarterly where input is sought for programming and direction.

The Rural Leadership ND Council serves as a stakeholder advisory board and meets two to three times per year to help guide Extension program directions.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

The State Board for Agricultural Research and Education (SBARE) operates on a two year cycle to prioritize needs because the North Dakota legislature only meets once per biennium. In FY10, SBARE ranked 10 program and infrastructure needs for both the ND AES and NDSU Extension Service for legislative consideration. Research needs (excluding infrastructure needs) identified for North Dakota were 1) enhancing soil productivity and land management with special focus on saline/sodic soils; 2) enhancing crop development efforts, including canola breeding and

support of the weather monitoring system for disease forecasts; 3) improving animal productivity and livestock stewardship; 4) crop commodity quality/trait and utilization development; 5) improving animal health care; 6) plant pathology for sunflowers; 7) enhanced support of the state data center; and 8) increased research on organic/sustainable agricultural systems.

Extension needs (excluding infrastructure needs) were identified in the areas of 1) soil health and land management; 2) livestock stewardship; 3) crop protection from pests; 4) agricultural entrepreneurship and rural business transition; 5) early childhood education and parenting; and 6) identity-preserved and specialty agriculture.

In FY11, these priorities were brought forward to the governor's office and legislature. Of these needs, funding was appropriated to AES to enhance research in 1) enhancing soil productivity and land management with special focus on saline/sodic soils; 2) enhancing crop development with canola breeding; and 3) improving animal productivity and livestock stewardship. Extension received additional state funding to support programming in 1) soil health and land management; 2) livestock stewardship; and 3) early childhood education and parenting.

Brief Explanation of what you learned from your Stakeholders

The most comprehensive input from stakeholders is compiled through SBARE as they receive input on research and educational needs from all commodities and locations across the state via Research Extension Center advisory boards. The key priorities identified for FY10 and enacted upon in FY11 are reported in the response above.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3312746	0	2947037	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1900800	0	2687580	0
Actual Matching	2851200	0	4031370	0
Actual All Other	0	0	0	0
Total Actual Expended	4752000	0	6718950	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change
3	Sustainable Energy
4	Food Safety
5	Childhood Obesity
6	Citizenship and Leadership Development

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	25%		0%	
202	Plant Genetic Resources	0%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		15%	
204	Plant Product Quality and Utility (Preharvest)	0%		5%	
205	Plant Management Systems	50%		0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		30%	
301	Reproductive Performance of Animals	5%		10%	
302	Nutrient Utilization in Animals	20%		10%	
305	Animal Physiological Processes	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	0%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	21.0	0.0	25.0	0.0
Actual Paid Professional	12.0	0.0	37.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
432000	0	1398600	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
648000	0	2097900	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Meet with stakeholder groups to gather input and refine program directions.
 Develop improved crop cultivars acceptable to growers and those who use and process the grain.
 Conduct research on alternative grazing and feeding systems.
 Conduct research on the effect of maternal treatments on the productivity of offspring.
 Present crop and livestock research results at field days and grower meetings, popular press, radio and TV spots, web sites, and educational classes and workshops to foster producer adoption.
 Evaluate the effectiveness and impact of the extension programming.

2. Brief description of the target audience

Grain and livestock producers, crop consultants, nutritionists and feed personnel, veterinarians, extension personnel, commodity groups, crop improvement associations, and grain processors.

3. How was eXtension used?

The 'Ask An Expert' widget/feature in eXtension was used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	27300	290000	500	1500

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	17	76	93

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of additional acres grown of new NDSU developed crop varieties with improved disease resistance and the ability to produce a high quality crop under both favorable and marginal growing conditions.
2	Number of North Dakota livestock producers with increased knowledge of practices to improve the efficiency of livestock production systems, including use of improved livestock genetics, use of practices to improve reproductive efficiency, and use of improved nutrition.

Outcome #1

1. Outcome Measures

Number of additional acres grown of new NDSU developed crop varieties with improved disease resistance and the ability to produce a high quality crop under both favorable and marginal growing conditions.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2640000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Growers, crop consultants, end users, grain marketers seek hard red spring wheat varieties with increased yield with maintained or improved quality profiles. All of these individuals rely on sale of grain to maintain the profitability and sustainability of their farms or their businesses. End use quality of new varieties is needed to maintain the milling and baking quality desired by processors and the consumer. Ultimately, wheat production needs to be increased to supply an increasing global demand for product.

What has been done

The hard red spring wheat breeding/genetics program is developing improved varieties acceptable to growers in North Dakota and those who use and process the grain. New varieties are yield tested by Research Extension Centers across the state for performance and comparison to existing public and private varieties. The performance results are summarized in Extension bulletins and are provided to growers at field days, workshops, and meetings.

Results

The NDSU hard red spring wheat breeding/genetics program has been highly successful in developing varieties with high yield and quality for North Dakota growers. Nearly 50% of the hard red spring wheat area in North Dakota in 2011 was sown to varieties developed by NDSU breeders. Glenn had the highest acreage of any variety in 2011 with 18.1% of acres, followed by Faller (11.5%), and Barlow (8.5%). North Dakota leads the nation in hard red wheat production with 5.5 million acres harvested in 2011; producing of 167.8 million bushels of crop valued at nearly \$1.4 billion. It also provided the milling and food industry with a high quality ingredient for additional value.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
702	Requirements and Function of Nutrients and Other Food Components

Outcome #2

1. Outcome Measures

Number of North Dakota livestock producers with increased knowledge of practices to improve the efficiency of livestock production systems, including use of improved livestock genetics, use of practices to improve reproductive efficiency, and use of improved nutrition.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3167

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cow-calf operations are an important industry in North Dakota, annually producing about 900,000 calves. Many variables contribute to the successful management of cow-calf and feedlot enterprises. Management decisions include nutrition (e.g. rations, alternative feedstocks, grazing strategies), reproduction (e.g. artificial insemination vs natural, calving season, etc.) and genetics (e.g. EPDs). Adverse environmental conditions, fluctuating commodity markets, and individual management decisions also have a dramatic impact on profitability. In order to proactively take advantage of available opportunities or to respond to situations as they develop, producers need new research and educational materials delivered to them in a timely manner.

What has been done

The NDSU Extension Livestock Team coordinates several educational activities to convey the latest research information to cattlemen. Each month the NDSU Extension Service delivers an electronic newsletter called The Ranch Hand to over 1,000 recipients. In 2010 and 2011, Beef Colleges trained 164 cattlemen on topics such as late season grazing alternatives, feeding cull cows, effect of an animal's disposition (attitude) on carcass traits, and fetal programming. The North Dakota Beef Quality Assurance program delivers educational programming to beef producers and youth involved in livestock projects on topics such as practices to improve cattle care, welfare and husbandry, methods to improve the quality and consistency of beef and beef by-products, proper use and administration of animal health products, and on the farm/ranch biosecurity.

Results

Ideas implemented from receiving training on efficient beef production practices are having direct impacts in North Dakota. 2011 survey results indicate 39% of producers receiving information decreased labor needs, 56% increased calf value, 62% increased net income, 63% saved money, and 71% improved productivity or production. Producers value this information and act as a multiplier to educate their peers. For example, 70% of The Ranch Hand readers told others about material in the newsletter and 53% sent electronic copies to others. Over 1,900 producers have been Beef Quality Assurance (BQA) certified through the North Dakota Beef Quality Assurance program. BQA certified producers report practice changes include moving injection site locations from the hip to the neck, keeping improved animal health records, body condition scoring their cows, and lameness scoring their herd. North Dakota Beef Quality Assurance certified producers annually produce more than 415,000 head of calves, which is over 45 percent of North Dakota's calf crop. In the fall of 2011, the value of this production was estimated to be more than \$290,500,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

North Dakota suffered severe flooding in 2011. This created demand for programs on alternative forages when pastures were not accessible. North Dakota also has many alternative crops and byproducts that can be used as feed, which creates interest and options, but these require testing for balanced rations. Total cattle numbers are declining because of the competition from highly profitable cash crops.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Summary of evaluation data provided in outcomes listed above.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
103	Management of Saline and Sodic Soils and Salinity	15%		15%	
205	Plant Management Systems	7%		7%	
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		8%	
212	Pathogens and Nematodes Affecting Plants	15%		15%	
213	Weeds Affecting Plants	15%		15%	
216	Integrated Pest Management Systems	10%		10%	
405	Drainage and Irrigation Systems and Facilities	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	15.0	0.0
Actual Paid Professional	22.0	0.0	24.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
792000	0	907200	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1188000	0	1360800	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 1) Establish the best water management practices for North Dakota
- 2) Create a system to reclaim salty areas within the farm
- 3) Calibrate fertilizer application under higher moisture environments
- 4) Adjust disease management for all the major crops due to increased rainfall and higher humidity
- 5) Survey and improve management recommendations for insect pests on the major crops
- 6) Adapt weed management strategies to changing cropping systems, including resistance management
- 7) Investigate agronomics due to the change in rainfall and longer growing season
- 8) Translate scientific findings into practical producer applications and provide transformational education through workshops, field days and conferences, and resource materials

2. Brief description of the target audience

- 1) Crop producers in both North Dakota and adjacent states
- 2) Crop consultants and agricultural advisors
- 3) County Extension personnel
- 4) Agribusiness and agricultural finance personnel
- 5) Government agency staff

3. How was eXtension used?

The Ask an Expert feature of eXtension was used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	39560	300326	318	1037

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	43	20	63

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers adopting new practices to achieve highly productive crops in a changing environment.
2	Number of farmers adopting new practices to improve pest management in a changing environment.
3	Number of farmers adopting improved soil and water management practices in response to a changing environment.
4	Number of soybean acres managed with best management practices by North Dakota soybean farmers.
5	Number of farmers and crop consultants trained in practices to improve management of soybean cyst nematode (SCN).

Outcome #1

1. Outcome Measures

Number of farmers adopting new practices to achieve highly productive crops in a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Since 1993, above average annual precipitation has created excess water on the landscape and this has impacted crop production significantly in North Dakota. The excess water has raised local water tables and increased the amount of saline affected soils throughout the state. Saline soils have a detrimental effect on farmer's yields. However, it also impacts lawns, pastures, parkland and virtually all land uses in the state. Since 1999, the Farm Service Agency has tracked prevent plant acres in North Dakota. In 2011, there were 5.62 million prevent plant acres and the impact on North Dakota farmers and ranchers was estimated to be \$1.1 billion dollars. The total loss to our state's economy in 2011 was predicted to be nearly \$3 billion.

What has been done

Regional North Dakota educational needs assessment showed that subsurface drainage education was listed as a top priority. The assessment, by farmers, identified crop response to subsurface drainage, design guidelines for subsurface water management systems, and environmental impacts of subsurface drainage water as educational needs. In 2011, meetings were held in 10 different counties in eastern ND and total attendance at these meetings was 509. In addition, subsurface drainage educational presentations were made at 11 state-wide events with attendance of 822 participants. Also, 9 plot tours of the NDSU tile drainage research site located on campus were conducted with 233 participants. Data generated from tile drainage research has been included in the educational presentations.

Results

The delivery of research and educational programs has enabled producers to make informed choices to adopt tiling. Consequently, 100 producers attending tile design workshops indicated they would install tile in 2011. Attendees estimated the value of the information gained at tiling workshops to be \$65 per acre. The yield increase with tiling is estimated to be about 10%. For a

120-bushel corn crop, the increase would be 12 bushels and at \$6.40 per bushel (August 2011 price), producer returns would increase by \$76.80 per acre in one year. The life expectancy of tile is likely more than 50 years. Based on other regions, the assumption is also made that the land value will increase approximately by the same amount as the tile investment because land productivity increases. It is estimated that a commercial tile plow can install tile at a rate of 7 acres per hour or at least 60 acres per day. Between wheat harvest (mid August) and freeze up there are approximately 100 workdays. Based on the seven commercial plows in the region, at least 42,000 acres have been tiled in the second half of 2011. Producers will be able to better manage these acres during the variable weather conditions that North Dakota has encountered in recent years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of farmers adopting new practices to improve pest management in a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat stem sawfly is a major insect pest of spring wheat, winter wheat and durum in North Dakota. Sawfly larvae feed inside the stem, which impairs grain development and may reduce grain protein. Mature larvae girdle the bases of plants, which results in lodging and further yield loss because it is difficult or impossible to harvest lodged plants. North Dakota wheat growers lose an estimated \$20-\$70 million annually to wheat stem sawfly in western North Dakota. Because of its long flight period and part of its life cycle being protected inside the stem, insecticides are ineffective at controlling wheat stem sawfly. Other effective Integrated Pest

Management (IPM) strategies need to be identified for control of wheat stem sawfly for wheat producers.

What has been done

NDSU Extension Service in collaboration with researchers, wheat commodity groups, and wheat producers, held several extension meetings and field days to address the wheat stem sawfly problem. In addition, multistate research projects were conducted to identify the best IPM strategies for wheat stem sawfly including use of solid-stemmed cultivars, insecticide efficacy, crop rotation, trap crops, cultivation, and conservation of native biological control agents. Extension newsletters, publications and videos also were developed to disseminate information about proper IPM strategies of wheat stem sawfly.

Results

Questions regarding wheat stem sawfly management practices were asked before the presentations and group discussions, and again at the end of Extension meetings. As a result of these meetings, 95% of growers are more likely to properly manage for sawfly; none of the growers will use insecticides for sawfly, compared with 8% before the meeting; 55% of growers will use solid-stemmed varieties, an increase from 12% before the meeting; growers will continue to use crop rotation as a management strategy; 5% of growers will use a trap crop, compared with 0% before the meeting; and 100% of growers will scout for sawfly, an increase from 56% before the meeting. Through breeding, improved wheat cultivars with wheat stem sawfly resistance will help increase yields and reduce economic losses of about \$22 million in sawfly damage in 2011. Since insecticides are not effective in controlling wheat stem sawfly, North Dakota wheat producers will lower input costs by \$10/acre. The total savings by eliminating insecticide applications for wheat stem sawfly is estimated to be over \$30 million in 2011, in addition to reduced environmental risks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Number of farmers adopting improved soil and water management practices in response to a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	9500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Previous nitrogen recommendations for wheat did not consider economic factors such as nitrogen cost or wheat price. The old system also expected wheat growers to estimate their yields before spring seeding. The new system includes factors such as nitrogen cost and wheat price, and relies on a review of historic yield potential rather than a guess of what the grower might achieve. The new recommendations also consider the economic benefit of N rate on wheat protein content, which often results in a higher bushel premium in some years, and always results in a dockage if the protein is below minimum standards.

What has been done

The new recommendations were built on archived nitrogen rate studies on wheat from the past 30 years, and half of the data-base included studies from 2005-2009. A total of 100 site-years of data were used to build the algorithms on which the new recommendations are based. There are three different recommendations based on regional climatic and soils within North Dakota. Higher productivity soils require higher rates of nitrogen. As wheat price increases, the profitability of higher N rates is greater. As N cost increases, the profitability of higher N rates decreases. Included in the new recommendations are nitrogen credits for long-term no-till fields, nitrogen credits for previous crops and credits due to pre-season nitrate soil analysis.

Results

The development and adoption of these wheat N recommendations is significantly increasing the efficient use and economic returns of N in North Dakota, which typically produces over 6 million acres of spring wheat. Of the consultants and ag-industry participants in the annual Soil and Soil Water Workshop in Fargo, January, 2012, half of the participants recommended wheat N rates to their growers using the new wheat recommendations. 98% of these consultants and ag-industry participants responded that the new wheat recommendations produced a better result than the older recommendations. A survey by the North Dakota Wheat Commission showed a marked improvement in spring wheat and durum protein content following adoption of the new wheat nitrogen recommendations compared both to previous years and to Montana and Minnesota, neighbors who were far less likely to use the new recommendations. The protein improvement alone was worth \$320 million in added receipts to wheat growers in 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
405	Drainage and Irrigation Systems and Facilities

Outcome #4

1. Outcome Measures

Number of soybean acres managed with best management practices by North Dakota soybean farmers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	200178

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

From 2000 through 2010, soybean harvested in North Dakota increased from 1.85 to 4.09 million acres. Due to the increased interest in soybean production in North Dakota, there is a need to educate newer and more experienced growers about all production aspects of growing soybean in the different regions of the state and improve pest management. Challenges include selection of short season varieties that fit the short growing season of North Dakota, new pests that are invading the state like soybean cyst nematode, and the appropriate use of pesticides such as foliar fungicides.

What has been done

The NDSU Extension Service specialist responsible for soybean, area agronomists, and county agents developed a training program called Getting it Right in Soybean Production. Meetings were conducted in 2011 at four locations. In addition, two regional events with a focus on soybean were conducted in the Red River Valley. The meetings educated soybean growers on variety selection, soybean diseases, intensive crop management, and the new pest in North Dakota, soybean cyst nematode.

Results

In a post education survey, 57% of the participants indicated that they learned something new and useful and 25% indicated that they gained important insight and information for their farming operation. Producers were asked the question: 'If you were to place a dollar value on the information you received (when you apply the knowledge you learned in your business), what would the value be?' The average value of those who answered was \$10.65 per acre. This equates to over \$2 million of total estimated economic impact based on 200,178 acres of soybean reported by responding producers. Producers indicated that they had obtained useful information to make informed decisions and make their farming operation more profitable with comments like:

1) I learned not to fertilize soybean with the seed; 2) Place more importance on maturity of soybean, and better utilize rotation to prevent disease; 3) Make sure P and K levels are at appropriate levels; and 4) Be aware of soybean cyst nematode. The ability of NDSU to use results from North Dakota field research, which is based on our growing conditions, is a key factor in the success of our educational programs and recommendations for our producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Number of farmers and crop consultants trained in practices to improve management of soybean cyst nematode (SCN).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	34

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soybean cyst nematode (SCN) is the most devastating disease of soybeans in North America, and has been identified in over 10 North Dakota counties, with an estimated 443,640 acres of soybean potentially impacted in ND by this disease in 2011. The disease is fairly new in ND, first discovered in 2002, and growers and educators need information on how to manage this disease.

What has been done

An intensive, two-day nematode short-course was hosted by the NDSU Extension Service and the ND Soybean Council in March 2011. The featured instructor of the course was Dr. Greg Tylka from Iowa State University, a noted expert on SCN. Thirty-four educational professionals

attended the fifteen hour program, with management information and hands-on training. All attendees were surveyed at the end of the 2011 growing season to determine their use of the material and changes in grower practices.

Results

Based on the feedback provided by the attendees, they indicated that a high percentage of them recommended appropriate management strategies for SCN (68% recommended soil sampling to determine nematode numbers and risk, 29% recommended a resistant variety, 19% recommended changes to crop rotation). Expected yield loss from SCN in ND is estimated to be about 12.5%. For every 1% reduction in yield loss as a result of this short-course, a \$67,640 return could be expected across the 443,640 acres impacted by the training, based on an average yield of 28.5 bu/acre and a \$11.40/bushel price. The implementation of the above practices could result in improved income to soybean producers in excess of \$1,000,000 by reducing losses due to SCN.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

Extreme weather conditions can interfere with the successful conduct of planned field research and affect grower perceptions of practices that are demonstrated in the field. Weather conditions, such as temperature, moisture, and dew periods, affect survival and reproduction of crop pests. ND has experienced approximately 17 years in a row of above normal precipitation, through 2011, which has impacted pest development.

Crop prices, costs of inputs, and farm policies affect the economic viability of new management practices and the willingness of farmers to try new practices. With the higher commodity prices that existed in 2011, growers were more receptive to try new management strategies. Government regulations dictate the availability of pesticides and genetically modified crop technologies that are available to growers to manage pests.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation results are explained in each Outcome Target Results sections.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	5%		5%	
402	Engineering Systems and Equipment	20%		20%	
404	Instrumentation and Control Systems	10%		10%	
511	New and Improved Non-Food Products and Processes	10%		10%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	20%		20%	
601	Economics of Agricultural Production and Farm Management	15%		15%	
604	Marketing and Distribution Practices	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.0	0.0
Actual Paid Professional	3.0	0.0	2.6	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
108000	0	98280	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
162000	0	147420	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 1) Conduct research on processing, densifying, storage, and transportation of biomass.
- 2) Conduct economic analyses of biomass sources for energy production.
- 3) Develop market quality and testing standards, including supporting infrastructure.
- 4) Assist growers in new producing regions with business organization, technology adoption, and market development, and formation of risk management strategies.
- 5) Provide educational materials and programming on production, economics, and policy analysis to decision makers, growers, and industry personnel.

2. Brief description of the target audience

- Farmers
- Policy makers
- Biomass processors
- Equipment manufacturers

3. How was eXtension used?

eXtension was used to deliver the webinar Building Code Basics in the Home Energy CoP by Carl Pedersen on May 6, 2011. In addition, the Ask an Expert feature of eXtension was used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	550	5000	10	100

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Determine the economic potential of pending biomass and energy beet opportunities in North Dakota and provide research-based information to all parties in this developing industry
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of growers and industry personnel who use research-based economic analyses when they assess biomass/energy beet contracts, rely on densification technologies to collect, store and transport biomass/energy beets and employ risk management strategies when they develop their business organizations to supply biomass/energy beets.

Outcome #1

1. Outcome Measures

Number of growers and industry personnel who use research-based economic analyses when they assess biomass/energy beet contracts, rely on densification technologies to collect, store and transport biomass/energy beets and employ risk management strategies when they develop their business organizations to supply biomass/energy beets.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

North Dakota farmers seek to develop new biofuel industries in the state and diversify their cropping operations. Additional corn production for traditional ethanol production is limited by the state's arid climate and adverse weather conditions in the past several years. Visionary farmers seek to develop a biofuel industry that aligns with national biofuel goals of producing fuel with lower carbon footprint. This will contribute to national renewable energy production goals while enhancing the local economic vitality of rural communities and sustaining farm profitability.

What has been done

Dr. Cole Gustafson initiated an energy beet development program in 2009. Phase I of the project which included exploratory financial and agronomic feasibility has been completed. With positive results, the project is embarking on a \$1,000,000 Phase II project that is half funded with a grant and the other half with private matching funds. Project leaders and collaborators have finalized the work plans and expect to finalize the technological pathway and begin construction of commercial plant in 2013.

To date, more than 20 presentations and workshops have been delivered across the state in cooperation with local Extension agents to inform producers, rural communities and industry of the opportunity. Materials have also been drafted for national distribution on www.eXtension.org.

Results

Data from seven regional energy beet yield trials show potential of 28 tons/acre dryland and 38 tons/acre irrigated. Data from these trials will be provided to USDA/RMA for purposes of developing a new energy beet crop insurance product to mitigate farm production risk. NDSU has prepared enterprise budgets and a lifecycle analysis which have been formally submitted to

U.S. EPA for approval of an energy beet biofuel pathway. Construction of a commercial plant is expected in 2013. This plant will require 30,000 acres of energy beets providing growers with a \$200 net income premium over competing crops. Each plant is expected to create 25 new jobs in rural communities. Positive encouragement and private funding support for the project has been received from MonDak sugarbeet growers, Syngenta, Beta Seed, Garrison Diversion, ND Irrigation Association, Green Vision, Great River Energy, Amity, and AgCountry Farm Credit Services. Studies on quality aspects of North Dakota biomass and infield logistics of biomass are underway.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes
512	Quality Maintenance in Storing and Marketing Non-Food Products
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Climate change policy which is the basis for many biofuel policies was not approved by U.S. Congress in Fall 2010. In addition, loss of the ethanol tax subsidy has resulted in less federal support of biofuels. Strong economic growth in western North Dakota due to expanding oil exploration has provided new project capital sources.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Impact described above compares economic impact of participants who would grow sugarbeets with those who do not. This year, yield trials were conducted to determine yield potential in new growing areas. Future studies will evaluate grower profitability from both production and investment in processing plant.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
504	Home and Commercial Food Service	75%		25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	25%		75%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	7.0	0.0
Actual Paid Professional	1.8	0.0	6.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
64800	0	226800	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
97200	0	340200	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Implement programs for children and adults based on Fight BAC, Thermy, Produce Safety and BAC Down campaigns; USDA food preservation rules; and implement food safety programs for foodservice and processors (ServSafe, TAPS, HACCP).

2. Brief description of the target audience

- Children in school and youth program settings
- Teen food handlers in high school and community
- Adults in home settings
- Volunteer food handlers in community settings
- Professionals in foodservice and food processing environments

3. How was eXtension used?

News releases were contributed to Families, Food and Fitness CoP. The Ask an Expert feature of eXtension was also used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5800	610000	9886	40000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	4	1	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Based on post-surveys, 50 percent of teens will report changes in food handling practices to reduce risk of foodborne illness outbreaks
2	Seventy-five percent of foodservice and food industry participants in ServSafe, HACCP or other food sanitation courses will pass the examination and become certified.
3	Based on post-surveys, 50 percent of adult participants in consumer food safety classes will report intent to change one or more food handling behaviors.

Outcome #1

1. Outcome Measures

Based on post-surveys, 50 percent of teens will report changes in food handling practices to reduce risk of foodborne illness outbreaks

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Seventy-five percent of foodservice and food industry participants in ServSafe, HACCP or other food sanitation courses will pass the examination and become certified.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Teens Serving Food Safely is a statewide NDSU Extension Service food safety education effort designed to improve young food handlers food safety knowledge and skills and decrease the risk of foodborne illness outbreaks associated with food service establishments. According to a 2002 U.S. Department of Labor report, 22% of employed 15- to 17-year olds work in eating and drinking establishments. According to the National Restaurant Association pocket fact book in 2004, one-third of all employed 15 to 17 year olds work in eating and drinking establishments.

What has been done

The Teens curriculum consists of five lessons based on the Fight BAC and Therymy national food safety campaign concepts, with pre/post and follow-up evaluation procedures. Youth benefit from the curriculum?s experiential learning model, obtaining information and tools to share with their families.

Results

Since 2003, 7,072 North Dakota teens have been trained and received completion certificates based on the Teens Serving Food Safely curriculum. According to the past year's results, on average, knowledge scores increased from 54% on the pre-test to 85% on the post-test. About

48% of participants had been involved in the preparation of food for the public, and 91% prepare food for themselves or others every week. On the one-month follow up survey, 70% were more careful about cleaning and sanitizing, 48% had shared their knowledge about food safety with others, 83% reported washing their hands more often when preparing food and 41% have applied their knowledge when serving food for the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Based on post-surveys, 50 percent of adult participants in consumer food safety classes will report intent to change one or more food handling behaviors.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5766

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Consumer food handling remains an issue of concern, and evaluations focused on outdoor grilling, a popular cooking method, and food preservation. Grilling is one of the healthier methods of preparing food; however, food safety issues, including quality issues and lack of thermometer use, have been cited as issues. Interest in food preservation has increased with rising food prices and renewed interests in local foods and gardening. Many younger adults lack experience with food preservation techniques and are seeking training so they preserve foods safely.

What has been done

A Barbeque Boot Camp program was initiated that brought together Extension, meat science, and food safety specialists and faculty from the Department of Animal Science, along with Extension agriculture and family and consumer science agents from across North Dakota. The boot camps were held in seven locations in North Dakota. The educational programs took place in classroom-type settings (educational booths) in public areas. Local Extension agents helped promote and, sometimes, teach the programs. Participants received a food thermometer and educational

materials to use at home. Food preservation classes were held in eight counties.

Results

The BBQ Boot Camp reached 788 participants and overall, more than 3,200 people in the past three years. Post-test scores showed that participants significantly increased their knowledge and indicated they would change their behavior. According to the post-survey results, 96% planned to use a thermometer when grilling after attending BBQ Boot Camp. They indicated their knowledge of meat and livestock topics and barbecuing skills improved. According to a follow-up survey, 82% of participants reported that they use meat thermometers and 53% of participants said they had changed their meat purchasing decisions after attending the program. About 500 people attended food preservation workshops. According to evaluations, all reported learning something new, all would add acid when canning tomatoes, all would use a pressure canner and 76% would only use research-tested recipes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Competing Public priorities

Brief Explanation

External factors, especially widespread flooding in the state, affected participation in the programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A research/extension project expanded undergraduate student numbers in food safety. Efforts focused on instructor training, curriculum development, and student recruitment and retention. Partners from New Mexico, North and South Dakota developed a summer-lab course, four interactive lab modules for didactic and online learning environments, a teaching format that integrated an online-delivery system with a face-to-face workshop, a career video, a recruiting brochure, and an educational game. Teaching materials with integrated food-safety concepts and career information were introduced to university students (n=416) as a pilot study. Following revision, the materials served as educational interventions, and pre- and post-surveys were administered to high-school students (n=138). Of the high-school participants, 39% have chosen a college major, and 18% plan to enroll in a food-safety program. The percentage of individuals who have decided on a major was greatest among individuals exposed to the career video (52%), compared to the brochure (27%), or game (21%). The number of undecided individuals was greatest at the high-school freshman level (38%). Project materials were uploaded to

university websites, and curriculum materials were distributed to survey participants, workshop attendees, including high-school teachers and Extension agents throughout the Dakotas, and individuals involved with the Nurturing American Tribal Undergraduate Research and Education (NATURE) program. Thirty-one students have enrolled in SDSU's summer-lab course. NDSU's student enrollment in food-safety majors and minors have increased from 7 students in 2008, to 13 in 2009, 19 in 2010, and 22 in 2011. The U.S. Department of Agriculture, SERD Grant 2008-38411-19055, supported this project.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	45%		45%	
724	Healthy Lifestyle	35%		35%	
802	Human Development and Family Well-Being	10%		10%	
806	Youth Development	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	0.7	0.0
Actual Paid Professional	4.0	0.0	1.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
144000	0	56700	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
216000	0	85050	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

School-based curricula, including "On the Move to Better Health", "Banking on Strong Bones", and "Going Wild" will continue to be used with children. Community-based programs for adults and children, including "Walk North Dakota" and "Moving More, Eating Smarter," will continue.

2. Brief description of the target audience

Children and adults will be the target groups for the programming. They will be reached with both direct and indirect methods.

3. How was eXtension used?

The Ask an Expert feature of eXtension was used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8600	640000	18000	65000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	10	2	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of children participating in the youth education curricula who will improve their diet quality and/or their physical activity level.
2	Number of adults participating in adult education curricula who will improve their knowledge of current nutrition and/or physical activity level.
3	Number of North Dakota families with youth that will increase their knowledge and consumption of beans to improve their diets.

Outcome #1

1. Outcome Measures

Number of children participating in the youth education curricula who will improve their diet quality and/or their physical activity level.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Childhood obesity remains an issue of concern in the U.S., with some researchers considering children to be 'overfed' but 'undernourished.' Diseases formerly associated with adults, including heart disease, are becoming more common among children.

What has been done

The overall goal of the 'Eat Smart. Play Hard. Together.' program is to increase knowledge and change behavior among children and their parents through the use of two curricula in elementary schools and a recognition program used in 4-H clubs. 'Banking on Strong Bones' is a five-week, school-based educational intervention for fourth graders. The purpose is to increase knowledge and change behavior regarding calcium-rich foods and weight-bearing activities. 'On the Move to Better Health' is a five-week school-based curriculum for fifth graders, which aims to increase fruits, vegetables and calcium-rich foods in the diets of children, as well as increase physical activity. 4-H clubs completed an evaluation process to determine if their club met the 'healthy club' criteria.

Results

From 2005-10, the 'Banking on Strong Bones' five-lesson program has reached more than 7,000 children and their families. Students improved their knowledge scores and reported positive attitude and behavior changes toward consumption of dairy products. About 1,600 fourth graders participated in the 2010 school year. On the pre-survey, 45 percent reported drinking three or more glasses of milk the previous day, compared to 63 percent on the post-survey. On the pre-survey, 14 percent reported drinking soda pop every day, compared to 11 percent on the post-survey. About 89 percent reported planning to drink more milk. According to the post-surveys of 1,945 fifth graders in the five-week 'On the Move to Better Health' program, about 56 percent reported increasing the amount of fruits and vegetables they consumed, 59 percent reported drinking more milk, 62 percent reported drinking less soda pop, 62 percent drank more water, 62

percent chose healthier snacks, and 63 percent increased the amount of daily physical activity. In 4-H youth programming, 290 children from 15 4-H Clubs from nine counties were recognized for completing the criteria required for recognition as 'healthy clubs.'

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #2

1. Outcome Measures

Number of adults participating in adult education curricula who will improve their knowledge of current nutrition and/or physical activity level.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of North Dakota families with youth that will increase their knowledge and consumption of beans to improve their diets.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Childhood obesity is a topic of concern nationwide, and the nutrition lessons learned early in childhood can have lifelong impacts. Gardening and other hands-on activities have been shown to be excellent methods to promote changes in children's diets, especially as a means of improving vegetable consumption. Research has shown that sometimes it takes 10 or more

exposures to new foods before children will accept them, and tasting foods with peers can promote increased acceptance of new foods.

What has been done

A preschool gardening and nutrition education program was developed and implemented as a pilot project at two preschools. The objectives of the four-lesson 'Spilling the Beans' curriculum, which was reviewed by child development experts, are the following: 1) Parents will be able to identify health benefits associated with beans; 2) Children will increase their knowledge of gardening; 3) Children will improve their knowledge of MyPlate; 4) Children will increase their awareness of different varieties of beans; and 5) Children and parents will have the opportunity to taste/try recipes containing beans.

Results

Forty seven families participated in the pilot project. Parents/caregivers significantly increased their awareness of beans as a source of fiber and folate and the link between beans and blood sugar management. The use of canned beans among the families significantly increased. About 88% of the parents reported reading the newsletter, 69% said their child talked about beans, 83% reported that their child talked about the gardening, and 85% of the children talked about tasting bean recipes. The preschool centers began to incorporate more recipes with dry edible beans in their menu plans. This program is part of the NIFA Common Bean Coordinated Agricultural Project, a multistate effort involving bean breeders and other researchers at several universities, including NDSU, and U.S. Department of Agriculture centers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

Although we experienced flooding in North Dakota, the natural disasters did not significantly influence our ability to do our work.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation results presented in the outcome results above.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Citizenship and Leadership Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation	20%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		0%	
806	Youth Development	75%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	0.0	0.0
Actual Paid Professional	10.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
360000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
540000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

A citizenship event will be held at the state capital. Youth will participate in club, camping, and national 4-H events. Parliamentary procedure and leadership resources will be provided to youth groups. Adults will receive training on economic development through workshops, newsletter and online resources. Adults will receive leadership training through the North Dakota Rural Leadership program.

2. Brief description of the target audience

Youth in each county of the state will have the opportunity to participate in 4-H clubs, camping and leadership development. Parents and educators will receive training on youth development issues. Adults will receive volunteer and leadership development. Potential and current small business owners will be targeted for entrepreneurship training.

3. How was eXtension used?

The Ask an Expert feature of eXtension was used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	26897	251020	17423	1750

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	13	2	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Characterize the positive personality traits of 4-H youth compared to non 4-H youth.
2	Percentage of 4-H club members who show improved leadership skills.
3	North Dakota citizens will create new jobs through the entrepreneurship of small business owners, focused in rural areas or involved in agriculture or value-added agriculture activities.
4	Number of youth and adult volunteers who participated in a community service project.
5	Number of adults gaining knowledge and skills to better advise youth who need to make difficult choices in a complex society.

Outcome #1

1. Outcome Measures

Characterize the positive personality traits of 4-H youth compared to non 4-H youth.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	206

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 4-H Youth Development program includes opportunities for youth to become involved in their community, build personal skills, and develop awareness through participation in state and national citizenship events. Leadership is developed through club and other group activities.

What has been done

It was planned to administer the study of positive youth development in North Dakota in 2011 but due to circumstances out of our control, another state in the North Central Region took that opportunity.

Results

Because we were unable to administer the study of positive youth development we have no results to report at this time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Percentage of 4-H club members who show improved leadership skills.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

North Dakota citizens will create new jobs through the entrepreneurship of small business owners, focused in rural areas or involved in agriculture or value-added agriculture activities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Economic developers have long realized that for sustained economic growth a strong small business segment is crucial. This segment has been found to be a substantial producer of new jobs and is the springboard for practically all businesses. It is also been recognized that successful small businesses capitalize on resources. In the case of North Dakota, these resources are our strong agriculture base, natural resources, and our rural nature. Small businesses are a crucial part of the ND economy with 99% of businesses identified as small. In the ag community, 40% of farmers are part-time, 48% of farms less than 500 acres, and 42% of farms have sales under \$10,000.

What has been done

For years, the NDSU Extension Service has responded to the needs of small business owners as resources and time permitted. In 2010, a new position was created, Rural and Agribusiness Enterprise Development Specialist, that would help rural and agricultural entrepreneurs identify local opportunities and then develop and implement effective business strategies that capitalize on those opportunities. In 2011 those efforts resulted in 779 individuals participating in small business workshops or getting one-on-one assistance. In addition, 23 news articles and 9 monthly newsletters were distributed to a mailing list of 176 individuals. Information is provided

nearly every day online through a dedicated website (www.ag.ndsu.edu/smallbusiness), a Facebook page (www.facebook.com/NDSUextsmallbiz), and Twitter (www.twitter.com/gmuske).

Results

Although the program is in its infancy, data has found that business owners are using the information provided. One individual is opening a second restaurant (20 new jobs); another continues to move forward with support from NDSU researchers and others on a horticulture project; a beginning artist is completing his second year of business and looks to have a break-even year; and a community-supported ag venture nearly doubling its membership to 70 families in their second year and looks to increase again to nearly 100 members in 2012. A food/craft cooperative is being discussed for Bismarck-Mandan. Eighteen business owners involved with the program in 2011 anticipate adding 18 jobs, and one of those plans an additional business in 2012. Workshop participants indicated an 87% gain in knowledge with the intent on using it to set up a business and help in marketing. Educational program grants of just over \$40,000 have resulted in a curriculum for direct online marketing of food products and work is continuing on assisting financial institutions to improve access and services for minority business owners.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #4

1. Outcome Measures

Number of youth and adult volunteers who participated in a community service project.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	113

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The first North Dakota Helping Hands Day was planned as an effort to support the Minot community in recovering from the devastating 2011 Souris River flood, which damaged or destroyed over 4000 homes. Minot is also significant to 4-H as the home of the North Dakota State Fair, which was also flooded and canceled. This affected 4-H youth from across the state. The initial desire of 4-H was to give back to the community that had generously supported 4-Hers

for decades and to build upon the basic 4-H principle of developing good citizens through service projects. Consequently, the idea grew into creating a day of service in which all North Dakota youth were challenged to lift their hands to larger service for the day.

What has been done

On Friday, October 21, 2011, the North Dakota Center for 4-H and North Dakota State University Extension coordinated youth and adults in making an impact in Minot through direct service in the community by coordinating the North Dakota Helping Hands Day. For those who could not attend the day of service in Minot, the option of volunteering at a distance to support the cause provided clubs and individuals an opportunity to create a program or event that in some way helped the Minot community.

Results

Through programs designed to encourage critical thinking and reflection, 4-H is helping to inspire our youth to continue a commitment to greater service. In direct service in Minot, 113 youth and adults from more than 20 counties served at one of six service sites in Minot. The sites included the North Dakota State Fair Grounds, the Humane Society, a local food bank, the local Salvation Army Coats for Kids program, one local soup kitchen, and at Sun Prairie Grain. The 4-H Helping Hands Day participants spent approximately 4 hours at each site, and their estimated value would be placed at over \$7,000 for the time spent at their service sites. Fifty-three participants also contributed to the program as a distance volunteer. From a Homemade Ice Cream Social to a Coat Drive, money and supplies were collected to help the Minot area. The economic value distance volunteers had with their efforts for 4-H Helping Hands Day was more than \$4,000. One participant stated "Because of our service, we are able to promote what 4-H is all about. The event was a great way to promote National 4-H week along with the Helping Hands Day and to help Minot's citizens who were hit by flooding. Just as the 4-H Pledge says "Our Hands to Larger Service", this was a way to help those outside of Dunn County who needed a "hand"."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Number of adults gaining knowledge and skills to better advise youth who need to make difficult choices in a complex society.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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2011

772

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With more than two-thirds of American teens having cell phones, teens send an average of 440 texts every week. While cell phones represent independence and communication for the users, the advent of text and picture messaging has led to some teens sending and receiving sexually charged messages. According to a recent study by the National Campaign to Prevent Teen and Unplanned Pregnancy, as many as 39 percent of teens today are 'sexting', which is sending or posting messages that are sexually suggestive on sites such as Facebook, MySpace, and Twitter, or sending text or picture messages via phone. Adults should understand that their own notions of what's public, what's private, and what's appropriate, may differ greatly from how teens and young adults define these concepts.

What has been done

It is essential for today's parent or caregiver to be aware of how young people are communicating with each other and how they are using technology. The North Dakota State University Extension Service has developed a curriculum for these individuals titled 'Sexting: What Every Caring Adult Should Know.' It strives to build awareness of the risks and repercussions of sexting and assist adults in helping teens make informed, ethical decisions about how they use their mobile technology. Extension agents have delivered this seminar across North Dakota to parents, youth, caregivers, school faculty, faith community leaders and other professionals who work with youth.

Results

In North Dakota, 722 adults received training through the sexting curriculum and increased their awareness of the issue. From follow up surveys the following impacts were reported. 36% planned to share the information with the teens they work with. As a result of this presentation, participants reported planning to: talk to their kids, be more aware of the issue, check their kids' phone regularly, and be cautious of the content in their own text messages. Participants stated they learned about the prevalence of sexting with today's youth, the legal repercussions and possible consequences, and how to report a sext message. Over 90% of participants would recommend this program to other educators.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

1) It was planned to administer the study of positive youth development in North Dakota in 2011 but due to circumstances out of our control, another state in the North Central Region took that opportunity. We were unable to administer the survey.

2) The devastating 2011 flood in the Minot community created a desire to give back to the community that supports 4-H youth, which resulted in the idea to create a day of service in which all ND youth were challenged to lift their hands to larger service for the day.

3) New social media technologies and peer pressure are creating difficult choices for today's teens.

4) In North Dakota's strong economy, there remains a substantial need for small business development both in those areas where there is tremendous growth and in those areas not feeling this impact. Also the wet years have caused some farmers and ag-related industries to look for other sources of income or ways to capitalize on the new resource, lakes and ponds. Our strong economy has brought an influx of immigrants to the state, many who are interested in starting a business. While all this is happening, the general US economic downturn has made it more difficult to obtain capital and has reduced support services from some agencies.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation results are presented in the outcome results above.

Key Items of Evaluation