2013 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 continues to be the dominant force in North Dakota's economy even though North Dakota has become the second largest oil producing state in the nation. The North Dakota Agricultural Experiment Station (ND AES) and NDSU Extension Service (NDSU ES) serve as major sources of innovation, new tools and knowledge, and educational support to agriculture's continued success. 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

Good soil health is necessary to maintain or improve North Dakota's economic prosperity and minimize environmental impacts caused by land management practices, according to a soil health advisory group formed by NDSU. The soil health initiative is being spearheaded by the ND AES and NDSU ES. In 2013, the Soil Health and Land Management program responded to the need for a whole systems approach to farm management, especially in areas where soil health is a primary concern. This was done through the development of the Soil Health and Agriculture Research Extension (SHARE) Farm. The SHARE Farm is located on a quarter section of land in Richland County and was established with the support of the ND Corn Council and ND Corn Growers. This site provides a location for integrated, whole system program development, where long-term, research and Extension activities across multiple disciplines take place. An advisory group (consisting of producers, commodity groups, consultants and NDSU research and Extension personnel) is used to guide the research completed on-site and to improve communication amongst groups. An annual field day and producer education groups associated with the SHARE farm are used as platforms to transfer ideas. There has been a very positive response to the development of the SHARE Farm, not only in the form of field day attendance, but also in feedback from county commissioners, commodity groups, and the media. We hosted our first annual field day on August 22, 2013 and had 220 attendees, most of which stayed throughout the entire tour. As a result of the field day, there was a 28%, 25%, and 43% increase in understanding of saline soil management, soluble salt movement, and whole systems management for soil health, respectively, for those attending.

The use of livestock in agriculture to produce food, fiber and provide labor has been unquestioned for centuries. Globally, due to shifting population demographics, and changing cultural and societal mores, the perceptions for livestock use and husbandry have come under increasing scrutiny. In response, NDSU created a faculty livestock stewardship position to provide leadership in this area and provide research-based information and recommendations for the livestock industry in North Dakota, the region, and nationwide. Utilizing a focus group, the Livestock Stewardship specialist organized and developed a livestock stewardship advisory board to help guide and support the Livestock Stewardship specialist's activities. Stewardship was defined as the careful and responsible management of livestock entrusted to cultural, and character traits of a Livestock Steward. A few examples of actions taken by the NDSU Extension Livestock Stewardship Specialist include: developing and currently serve as a technical expert and host of a national radio program (SiriusSM Rural Radio, "Vets on Call") and regional TV ("Stewardship Moment") programs that focus on livestock stewardship issues that include appropriate animal handling, livestock health programs, animal husbandry, consumer perception issues and being good stewards of the land and the livestock raised on it; and assisting other universities in the development of stewardship positions. Due to our communication efforts, the term and definition of stewardship are now being used by

other speakers and behavior patterns are changing regarding animal handling, animal husbandry, and stewardship of resources.

Climate Change

NDSU's 85-year-old corn breeding program is the most northern public program of its kind in North America. Through the use of managed control winter nursery conditions such as no rain and extreme cold, NDSU annually screens thousands of corn lines for a drought and cold tolerance. New corn lines are developed very fast (four years vs. 15) to allow movement of corn hybrids north to cooler seasons and west to dry areas. NDSU is a genetic provider to the corn processing industry, foundation seed companies, retail seed companies, and breeders nationally and internationally. With the support of the corn industry and the Minnesota and North Dakota corn grower organizations, the program annually screens more than 1 million genotypes in breeding nurseries and hybrid experiments across more than 50 NDSU and industry locations. NDSU has developed and distributed 54 elite and diverse corn lines to the industry in the past five years. These lines have generated fees and royalties for NDSU. The program's large network of cooperators reduces NDSU's investment in costly academic labs or other resources. Research on fast dry-down has led to a new breeding methodology that saves millions of dollars in farmers' artificial drying and industry screening costs. NDSU's EarlyGEM program increased the genetic diversity of northern U.S. hybrids by adapting tropical corn to shorter growing seasons. Corn breeding for short-season environments has been essential to move corn from a minor to a major crop with the highest profitability in the region. NDSU is the only genetic provider with 70 and 75 RM (relative maturity) hybrids. Industry data show NDSU's corn lines are the best for lodging resistance, test weight, green snap tolerance and staying green. Hybrid checks are the lowest in grain moisture at harvest and tops for yield, and ethanol and feedstock quality, in northeastern North Dakota performance trials.

Greenhouse gas emissions (GHG) from beef feedlot cattle can stir a vigorous debate in the public sector. Research indicates that limiting carbon/nitrogen inputs through the manipulation and management of beef feedlot cattle can be an effective tool for reducing emissions from beef feedlot operations. However, research on the impact of dietary manipulation on the composition of the resulting manure from these cattle and environmental impacts of GHG is not readily available, especially in the Northern Plains where dry and distiller's grains and soluables (DDGS) from the ethanol industry are abundant and used in cattle diets. A research and Extension project evaluating the effects of two different dietary protein levels (16% vs 13%, obtained through the use of DDGS on manure composition and subsequent GHG emissions was completed at the NDSU Carrington Research and Extension Center feedlot. Total nitrogen content was higher in manure from pens with cattle fed the higher protein diet. This increased value of the manure as fertilizer. There was no difference in GHG emissions across manure management and dietary crude protein levels. This would indicate that the use of DDGS could be an effective way to increase the protein content of beef feedlot cattle diets in the Northern Plains and yet not raise GHG emissions. This along with other research at NDSU to aid livestock producers in developing and implementing manure management practices that minimize the impacts of beef feeding operations on the environment.

Sustainable Energy

High oil prices have led to a global search for alternatives to the wide range of fuels, chemicals, and materials currently made using petroleum. Among the best opportunities is producing biofuels and bioproducts from sugar. However, today's worldwide sugar growers and processors target sugar production towards the food market. Launching a new regional sugar sector that targets non-food industrial uses requires a substantial research and development effort that considers agronomics, engineering, and economics. Since 2008, NDSU ES has educated potential growers and others about the economics of industrial energy beet production and processing as well as industrial energy beet agronomics, post-harvest logistics, and process engineering. In 2013, economics-focused activities included the development and distribution of educational materials on expected inputs and returns. Short educational programs were held as part of crop tours held across the state. These programs were attended by interested farmers, community leaders, government officials, county Extension agents, and others. Face-

to-face and other direct conversations with project developers, engineers, microbiologists, agronomists, growers, and interested individuals occurred throughout the year. Discussions focused on market opportunities for industrial sugar and sugar-based products as well as tradeoffs that exist form field to final product, which in many cases is captured by prices. Understanding the economics of industrial beet production and processing has allowed the diverse group of industrial beet stakeholders to advance more quickly than would have otherwise be the case. For example, having information on relative returns to industrial beet production enabled potential growers to develop an immediate, although no complete, understanding of the economic impacts of incorporating industrial beets into their operation. Similar learning was experienced by scientists who wanted a measure of the potential impact of their work. This was the case with a biotech firm looking to engineer higher yielding beets that are more water- and fertilizer-use efficient than existing sugar beet varieties. Development efforts in North Dakota are transitioning from research to commercialization. Five potential sites for the first industrial beet processing facility have been identified. Formal grower education meetings in each of these communities will begin in early 2014. Industrial beet production and processing is expected to begin in 2017.

Energy development and the associated impacts have influenced western North Dakota residents and businesses far beyond expectations. What had been business as usual has become the infrastructure of change in housing, employment, education, transportation, and associated services. As a result, NDSU's Dickinson Research Extension Center (DREC), along with other NDSU researchers and faculty, is formulating a response, called "A Commitment to Continue", to meet the challenges of change. The goal is to cooperatively produce significant research and education on the ways to assist the agricultural and energy industries. Significant land area is required to build roads, control dust, grow field crops, graze livestock, build oil extraction pads, engage in mining activities, dispose of drilling and mining wastes, and construct pipelines, and all of these activities have impacts. These land-based interactions between agriculture and energy development create a challenge in developing a science-based understanding that will allow agriculture and energy to co-exist in a way that's productive for North Dakota's economy, as well as conserves and preserves the land for future generations. The NDSU DREC is integrating the needs of the energy industry into a legislatively directed mission by expanding its relationship with the energy industry and working with agricultural producers to protect and preserve North Dakota's air, water and soil. This stakeholder cooperation is paramount to grow North Dakota's economy, strengthen its quality of the life and enhance collaboration to address the needs of the people, developers and resources. The DREC has identified four general areas in which to expand research and Extension efforts: energy co-dependence, food production, teaching and Extension, and technology.

Food Safety

Researchers in NDSU's Veterinary and Microbiological Sciences Department are hoping to find ways to make lettuce and some other popular foods safer to eat. They are trying to understand how foodborne pathogens, specifically salmonella and E. coli 0157:H7, survive on lettuce after it is harvested washed and packaged, and reaches consumers. They are also studying how these pathogens adapt to conditions that are not optimal for the pathogens growth. Salmonella and E. coli have been linked to illness outbreaks in lettuce, spinach and other fresh produce. The researchers hope to use the information to develop different decontamination treatments, and make recommendations to producers and processors. They expect to have results in early 2014. The researchers are doing their work at NDUS's new Greenhouse Complex, which allows them to simulate growing conditions under different temperatures, humidity levels and ultraviolet light conditions. In another study, the researchers are evaluating some antimicrobial agents as potential methods for inhibiting the growth of another pathogen, Listeria monocytogenes, in refrigerated ready-to-eat foods such as deli meats and hot dogs.

Child Obesity

Obesity and lack of calcium are two major health issues facing today's youth. Childhood obesity, which has more than tripled in the past 30 years, puts youth at higher risk for cardiovascular disease, diabetes, strokes and cancer. A calcium shortage during childhood increases children's risk of developing

osteoporosis, a disease that leads to weak bones during adulthood. NDSU Extension partners with schools statewide to reduce that risk through three main programs:

- On the Move to Better health, a five-week curriculum for fifth graders. Based on MyPlate, the U.S. food guidance program, it aims to increase fruits, vegetables and calcium-rich foods in children's diets and improve their fitness habits. Nearly 10,500 children and their families have participated since 2007.
    - 61 percent of the fifth-graders increased their daily physical activity and 54 percent ate more fruits and vegetables.
- Banking on Strong Bones, a five-week program for fourth-graders. This program, also based on MyPlate, includes classroom nutrition lessons with participation incentives, educational materials in libraries, supplementary activities and taste testing. About 8,770 children and their families have participated since 2005.
    - Fourth-graders daily milk consumption increased from 75 to about 81 percent while soda pop consumption dropped from 16 to 12 percent.
- Go Wild With Fruits and Veggies! A seven-week program targeting third-graders. Six wild animal characters are role models that reinforce the importance of eating fruits and vegetables and participating in physical activity every day. A little more than 500 children completed it in 2013, the first year the program went statewide.
    - 8 percent of the third-graders were more physically active, 90 percent ate more fruit and 72 percent ate more vegetables.

Research shows that poverty is a key factor in food insecurity, or limited/uncertain access to nutrition, safe foods. Inadequate resources can lead to families buying high-calorie, low-nutrient, low-cost foods instead of more healthful options. Poor diets can increase people's risk of obesity and related health issues, such as diabetes and heart disease. Expanded Food and Nutrition Education Program (EFNEP) offers a series of free lessons for limited-resource adults with children in the household. The lessons help them improve their nutrition knowledge, physical activity and food safety practices, and stretch their food dollars. EFNEP also provides youth groups with programming to increase their consumption of fruit, vegetables and low-fat dairy products, and become more physically active. Family Nutrition Program (FNP) is for individuals who receive or are eligible for Supplemental Nutrition Assistance Program (SNAP) benefits. FNP educators teach participants about nutrition to help families balance healthful food with physical activity and get the most nutrition for the money they spend on food.

In 2013, FNP provided direct education to 2,760 adults and 10,892 youth, and reached more than 55,000 people indirectly through nutrition education articles and community events. Specific impacts include:

- More than 60 percent of adults adopted at least one habit for spending their food dollars more wisely, such as shopping with a grocery list
- 68 percent of youth eat more vegetables of different colors
- 72 percent of youth choose mild instead of soda pop
- 89 percent of youth are more physically active

Of the 243 adults and 1,381 youth EFNEP participants in 2013:

- 54 percent improved at least one food safety practice
- 76 percent improved at least one food resources management practice
- 82 percent improved at least one nutritional practice

Citizen and Leadership Development

NDSU is spearheading a multi-year project to improve the land and lives of people on the Standing Rock Sioux Reservation. The 202 million acre reservation straddles the North Dakota-South Dakota border and is home to about 9,000 people. Inadequate land management led to degraded rangeland conditions,

including poor forage production, large prairie dog towns and considerable erosion potential. NDSU is partnering with South Dakota State University, the U.S. Department of Agriculture and Sitting Bull College (1994 Land grant) in an effort to renew the land and increase beef production on the reservation. One of the main goals of this project is to develop a natural beef production system that will provide a source of meat that is healthy and nutritious for the Standing Rock people. Additional benefits of the project include: adding ranching, beef processing and marketing jobs; exposing students to a high-quality research program and some of the best researchers in the world: and giving students opportunities to work on this research and conduct their own research. Project accomplishments include: evaluating the interaction of the Sioux people's cultural traditions and this project, completing initial evaluations of forage, soils and wildlife surveys, and initiating opportunities for students and Native American ranchers to learn modern and sustainable beef production strategies.

Shooting sports is one of the NDSU Extension Service's fastest-growing youth leadership and development programs. Five years ago, it had 80 to 90 youth in four shooting sports-focused clubs. In 2013, it had 528 youth in 21 shooting sports clubs. Shooting sports activities are offered in 41 of North Dakota's 53 counties. The program is successful because it is not a one-time experience. The program provides access to trained coaches and adult mentors who are willing to devote time to allow our youth to pursue their interest through multiple years and in a variety of ways. About 600 trained volunteer 4-H Shooting Sports instructors devote more than 2,000 hours to the program each year. Shooting sports is part of the 4-H Environment Projet, which educates youth about natural resources and wildlife, archery, black powder weaponry, pistol, rifle, shotgun and hunting. Youth can participate in local, state, and national competitions. The shooting sports program brings in new youth and families to 4-H and opens their eyes to all the possibilities that 4-H offers. A young participant aged 14, likes what shooting sports has taught him, "We have a lot of really good coaches that teach us the skills we need, but learning how to handle the mental part of competition is a challenge," he says. "Shooting sports has helped me to learn how to focus under stressful situations, which is a skill that I can use in other areas of life."

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	53.0	0.0	71.0	0.0
Actual	57.5	0.0	74.5	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 four different types of scientific peer review. These reviews occur prior to, during and at the conclusion of each research project. First, research faculty who participate in multistate research projects receive a critical review of their contributing project from fellow committee

members, the administrative adviser and the North Central Multi-State Research Committee. Second, most faculty augment their multistate research funding with competitive grants. These grants are awarded on the basis of scientific merit and afford an opportunity for external peer review. Third, each research faculty member with the ND AES is required to have a station project that is reviewed for scientific merit by a Project Review Committee that is comprised of one faculty member from each discipline. Finally, all research is peer reviewed, either internally or externally, prior to publication.

Extension program leaders in agriculture and natural resources, family and consumer science, 4-H and youth development, and community resource development from the North Central Region meet twice a year to evaluate program needs and develop plans of work for the whole region. Ongoing efforts are made to update North Central regional logic models and develop and collect multistate impact indicators. State Extension specialists frequently submit grant proposals to regional and federal agencies and commodity groups to fund applied-research and Extension program activities. These proposals are externally reviewed prior to selection for funding. Extension bulletins are internally peer reviewed prior to publication.

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.

Building linkages with the public enables us to discover information about community/county/district/state assets and needs. Various methods for stakeholder input are utilized on an on-going basis. Advisory and commodity boards are used annually to identify issues and refine research and Extension programs. Examples include county extension advisory boards, Sustainable Agriculture Research and Education (SARE) advisory board, nutrient management advisory board, soil health advisory board, sugar beet research and Extension board, research extension center (REC) advisory boards, and the State Board of Agricultural Research and Education (SBARE). Input from stakeholders, the general public and from targeted audiences is used to develop our five-year plan of work and to make adjustments to the plan based on crisis situations that may develop in the state, e.g. drought, flood, insect infestations, plant diseases, high-risk issues of youth, bioenergy economics, animal welfare issues. Using several methods and several venues to collect data ensure that high priority issues are identified, people that have self-interest in the issue are brought to the planning meetings, and the appropriate research project or educational program and design is developed to address the issue using a variety of delivery methods.

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 of Agricultural Research and Education (SBARE) is charged by the state legislature to determine the causes of any adverse economic impacts on crops and livestock produced in this state; develop ongoing strategies for the provision of research solutions to negate adverse economic impacts on crops and livestock produced in this state; develop ongoing strategies for the dissemination of research information through the NDSU ES; annually evaluating the results of research and extension activities and expenditures; and report the findings to the North Dakota Legislative Council and the State Board of Higher Education. SBARE actively solicits input from all sectors of agricultural interests (i.e. different commodity and livestock groups) and meets throughout the state to gather input.

County commissioners actively participate in county extension program reviews with extension district directors. The county extension budgeting process also results in strong engagement from county government. Local needs are also identified through input from crop and livestock improvement boards, soil conservation districts, 4-H councils, and area focus groups. End of program surveys are used at most county and state extension programs to identify emerging clientele needs.

In 1992, the North Dakota Department of Human Services and NDSU ES were legislated by the North Dakota state legislature to form 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 six family life education coordinators provide evaluation feedback to the Family Life Education Committee of the state Department of Human Services on program impacts. These impacts are then shared with state legislators.

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.

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 process of collecting stakeholder input was described above in III, 2(A),1 along with the process in identifying stakeholder groups and individuals.

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) is charged with developing ongoing strategies for the dissemination of research information through the ES; annually evaluating the results of research and Extension activities, recommending faculty and support positions and areas for program expenditures; and reporting the findings to the North Dakota Legislative Council and the State Board of Higher Education. Their findings directly affect the research and Extension budgeting process.

Commodity councils and research-education boards guide research and Extension program priorities and activities through their call for proposals, proposal review sessions, and grant funding. The staff from the seven Research Extension Centers (RECs) uses the input from winter meetings with their advisory boards to set program direction for research projects and Extension programs at their centers.

During county staff evaluations each year, program input is gathered from commissioners who take part in the staff evaluations. This arrangement helps assure that extension programs are grass roots driven and are focused on local issues and needs. County commissioner input is also critical in determining the staffing level and emphasis within county Extension offices as 50 percent of the Extension agent's salary is paid by the county.

The statewide Family Life Education Committee, 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 determine the availability of designated funds which direct the focus of the parenting education programs provided through

the six family life education center coordinators. The six family life education coordinators provide evaluation feedback to the Family Life Education Committee of the state Department of Human Services on program impacts. These impacts are then shared with state legislators which in turn affect budgeting.

Stakeholders are frequently important contributors on the search committees of Extension state specialists and county commissioners are partners in the search committees and interview process of county staff. A SBARE member or another stakeholder is often a representative on faculty position searches.

Brief Explanation of what you learned from your Stakeholders

Our stakeholders are very supportive of the ND AES, NDSU ES and their activities and efforts. It is very important that Federal capacity be maintained to ensure NDSU's continued success. The ND AES and NDSU ES enhance the lives of the citizens of ND.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3108813	0	2729768	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1319546	0	1677306	0
Actual Matching	1319546	0	1677306	0
Actual All Other	2127628	0	4754475	0
Total Actual Expended	4766720	0	8109087	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

☑ Reporting on this Program

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	37.0	0.0
Actual Paid Professional	20.4	0.0	40.2	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**
487054	0	959198	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
487054	0	959198	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
649845	0	2621052	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?

eXtension was of limited value to the Global Food Security and Hunger program. We averaged 1 question every 2 months on topics related to livestock nutrition and how to secure more livestock per unit of land (final output more food per unit of land).

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	641	25000	176	3000

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	7	39	46

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 with 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.
3	Number of new NDSU developed crop varieties with improved disease resistance, the ability to produce a high quality crop under favorable and marginal growing conditions with educational efforts to enhance their adoption by producers.

Outcome #1

1. Outcome Measures

Number of additional acres grown with 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.

Not Reporting on this Outcome Measure

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
2013	481

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Feed costs are a major component of overall production costs in cow/calf, growing, and finishing cattle systems. Improving the efficiency of feed utilization or using lower cost feeds, therefore, can have dramatic effects on profitability and sustainability of the beef industry. This research is aimed to improve the profitability of beef cattle production through improving efficiency of production and/or reducing input costs. Improving efficiency also has the potential to reduce the environmental impact of beef production systems. This research aims to improve efficiency of production through integrative research on nutrition, genetics, and reproduction of ruminants. These research objectives include both basic research to better understand physiological systems important in regulating feed efficiency as well as studies to examine the effects of different nutritional or management programs on performance in ruminants.

What has been done
Research projects were conducted on 1) the effects of limit-feeding and time of feed consumption (day vs. night) on growth performance in growing cattle, 2) the effects of forage source in finishing

cattle diets on feeding behavior and growth performance, and 3) economic and growth performance of late-season grazing annual forages designed to improve soil health characteristics (thus increased crop production for food security).

Results
The summarized research results are: 1) limit-feeding of a corn silage-based diet reduced average daily gain and cattle consuming feed in the evening tended to have increased ADG compared to cattle consuming feed during the day or half during the day and half during the evening, 2) including alfalfa, corn silage, corn stover, or wheat straw at similar NDF inclusion levels resulted in similar growth performance although cattle consuming corn stover and wheat straw spent more time eating per meal to consume a similar amount of DM, and 3) dual cropping marginal cropland that harvests crops grown for food followed by harvesting a second with livestock that are eventually harvested for food is more cost effective than a single cropping system or traditional drylot feeding when moisture conditions are average or greater. These results have provided information on changes in feeding management on growth and efficiency and increased our knowledge on how nutrition impacts feeding behavior which could result in feeding or management approaches that influence feeding behavior to enhance the efficiency of feed use in cattle. Results have been presented at extension and scientific meetings in ND and elsewhere.

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
702	Requirements and Function of Nutrients and Other Food Components

Outcome #3

1. Outcome Measures

Number of new NDSU developed crop varieties with improved disease resistance, the ability to produce a high quality crop under favorable and marginal growing conditions with educational efforts to enhance their adoption by producers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2013 2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Grain producers, crop consultants, Extension personnel, commodity groups, crop improvement associations, and grain processors.

What has been done
NDSU has developed new and improved germplasm in 14 crops, including some with multiple market classes. Improved germplasm has improved resistance to abiotic and biotic stresses. The improved germplasm also has improved end use quality that is desired by those who use and process the harvested seed.

Results
The flax line N06 2055 (CI3329/McGregor) was released as "Gold ND". ND06 2055 is a blue-flowered, yellow-seeded, high yielding yellow flax line with good oil content and oil drying quality. When averaged across all locations and years, N06 2055 yielded 8% more than the highest yielding named variety Carter and 18% more than the popular yellow seeded variety "Omega". The durum wheat line D04581 (Maier/D97643) was released as "Joppa". D04581 is a high yielding line, with excellent end use quality that has been tested in replicated yield trials since 2005. Averaged across all station-years of testing in the Uniform Regional Durum Nursery in Minnesota, Montana, North Dakota, South Dakota, and Canada, D04581 has out yielded all NDSU named cultivars. Test weight of D04581 is similar to that of Divide and Tioga. D04581 has a good disease-resistance package, including resistance to the prevalent races of leaf and stem rust, foliar disease scores lower than that of all cultivars except Grenora, and lower DON accumulation than all cultivars except Divide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

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

2013 was a good year for producers in ND. Weather extremes occurred at times that had minimal impact on research and Extension programs. Public policy changes were

minimal and government regulations were stable.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Surveys conducted by North Dakota State University Animal Sciences Extension Service showed over 17% of North Dakota livestock producers plan to add dual cropping systems to their livestock feeding operations within the next five years. This influx of dual cropping has the potential of impacting 2.3 million acres of cropland. This management technique has the potential of increasing pound of food per land area by 50 to 70% in 2 out of 3 years in the Northern Plains states. This increase in meat from livestock equates to 135 lb/ac using a dual cropping system. This is added income and food from the same land base.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	22.0	0.0	24.0	0.0
Actual Paid Professional	19.8	0.0	24.5	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**
541809	0	627676	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
541809	0	627676	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
538477	0	1183615	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Establish best water management practices for North Dakota
2. Create systems to reclaim saline and sodic areas within farm fields
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 agronomic systems that are adapted 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12537	37500	155	640

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	37	34	71

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.

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
2013	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Greater farm input efficiency is desirable for both conventional and organic systems in order to increase grower profitability and decrease loss of inputs into the environment. Failure to consider soil sodium may contribute to plugged tile lines and lower productivity in some soils after tiling. High clay soils and coarse-textured soils experience large losses of nitrogen (N) due to denitrification and leaching in some years, resulting in lower profitability for farmers and increases in atmospheric nitrous oxides and increases in surface and ground water nitrates. Indiscriminant use of fungicides results in lower grower profit and wasteful applications. Herbicide resistant weeds are expanding in acreage and threaten to destroy the productivity of millions of acres of farm land if current practices are used. Grower adoption of integrated pest management (IPM) practices are necessary to increase grower profitability and avoid unnecessary pesticide application.

What has been done
Grower meetings, presentations to agriculture industry representatives, grower production consultants, field days, field tours, media presentations, news releases and web-based information has resulted in grower and industry movement towards more efficient input application practices.

Results
The number of growers that consider soil chemistry in planning drainage projects has increased. The number of growers that understand sources and possible alleviation of soil salinity and sodicity has increased. The adoption of side-dress, split-N applications to increase N efficiency has increased. The number of growers using weather modeling to schedule fungicide applications has increased. Growers are slowly increasing their use of pre-emergence soil-applied herbicides to overcome post-emergence herbicide weed resistance. Grower adoption of improved agronomic

and IPM practices is increasing due to transformational education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
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
2013	2800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Each year, there are numerous plant pest and agronomic problems (early frost, drought, flooding and other situations) that can negatively impact North Dakota's crop production. Producers, agronomists of fertilizer/chemical/seed companies, crop consultants, state and federal agencies, field scouts and university extension and research workers need the latest information on plant pests, agronomy and weather problems to maximize crop yields and quality.

What has been done

The NDSU Extension Crop & Pest Report is a weekly newsletter which includes many

articles on plant pests (insects, diseases and weeds) of field crops, and agronomic updates on crops and soil conditions. These articles are written by NDSU extension specialists and county extension agents. Valuable and timely information is described in pest alerts, integrated pest management strategies, pesticide updates, agronomy, soil and fertility issues, reports from the NDSU Plant Diagnostic Laboratory, important Extension meetings/Field Days and weather outlooks. Any audience group can easily access it via internet or weekly electronic mail list.

Results
Readers of the Crop & Pest Report were mainly comprised of producers, agronomists of fertilizer/chemical/seed companies, university extension/research workers and crop consultants. The number of readers has increased 10 times to more than 2,800 readers today. Highlights include:
- Provides easy to read and understand articles with objective opinions on the "best" strategies for pest management and crop production.
- Provides early pest alerts of important plant pests of agricultural field crops.
- More than 90% of readers reported sharing information from the newsletter with other professionals.
- About 88% of readers used additional information in articles to further research topics, such as internet links. Some examples listed were: pesticide labels, NDAWN, disease forecasting models, annual crop pest management guides, and extension publications.
- More than 67% of readers said that there were subjects covered in Crop & Pest Report that influenced their crop production practices.

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
213	Weeds 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
2013	130

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. Millions of acres could not be seeded in 2013 due to access moisture in the spring.

What has been done
During 2013 presentations about tile drainage were given at over 20 meetings throughout North Dakota and the Red River basin area of Minnesota. Thirteen different counties conducted tile drainage seminars. Seminars were given to several businesses and industries such as Agassiz Drain Tile. Subsurface drainage educational presentations were given at "state" events such as the Best of the Best in crop production workshops. Also, NDSU Extension cooperated with SDSU Extension and the University of Minnesota Extension to organized three, 2-day tile drainage design workshops. One was held in North Dakota, one in South Dakota and one in Minnesota. Total attendance for the 3 workshops was over 180 persons.

Results
Tile drainage education was provided to over 1,450 persons in 2013. Each of the three tile design workshops was evaluated with an "end of the course" survey. One of the questions we asked was "If you were to place a dollar value on the information you received (when you apply the knowledge you learned in your business and not the price you paid today) what would it be?" When the responses from participants were tallied, they indicated the perceived value was well over 3.5 million dollars.

In October, 600 copies of Extension bulletin AE1690 Frequently Asked Questions About Subsurface (Tile) Drainage was published, by December another 500 copies had to be printed to satisfy the demand.

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

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

2013 was a good year for producers in ND. Weather extremes occurred at times that had minimal impact on research and Extension programs. Public policy changes were minimal and government regulations were stable.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations were received from meetings and tours from numerous events, including the SHARE farm field tours, Soil Health Team presentations, Advanced Crop Advisor workshop, Eastern and Western Crop Scout schools, Soil and Soil Water Workshop, IPM surveys, dry bean survey, wide world of weeds survey, sugar beet survey. Survey results indicated grower adoption of concepts and methods to improve their input efficiency.

As stated before, tile drainage education was provided to over 1,450 persons in 2013. Each of the three tile design workshops was evaluated with an "end of the course" survey. One of the questions we asked was "If you were to place a dollar value on the information you received (when you apply the knowledge you learned in your business and not the price you paid today) what would it be?" When the responses from participants were tallied, they indicated the perceived value was well over 3.5 million dollars.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

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	20%		20%	
402	Engineering Systems and Equipment	10%		10%	
404	Instrumentation and Control Systems	10%		10%	
511	New and Improved Non-Food Products and Processes	20%		20%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	10%		10%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.6	0.0
Actual Paid Professional	2.0	0.0	3.7	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**
85860	0	78942	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
85860	0	78942	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
23828	0	283005	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conduct research on processing, densifyng, 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 not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	784	4736	0	0

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

Patent Applications Submitted

Year: 2013
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	5	8	13

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 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
2013	137

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Energy beets continue to have a strong potential for filling the niche of "advanced biofuels" as defined in the renewable fuel standard of the 2007 Energy Independence and Security Act. Energy beets also are being considered as a source for industrial sugar for other bioproducts. Storage and processing issues remain as key questions to consider. A variety of biomass feedstocks are also required to meet the growing requirements of cellulosic biofuels. The high density of these materials impact transportation, storage, and handling costs and densification has shown to benefit processing as well as feedstock logistics.

What has been done
Research and extension personnel continued to work closely with a group of ND industrial leaders to explore the agronomic and economic potential of growing energy beets through ND. The team has met with growers in a number of areas to educate them about the opportunity and discuss any questions they have. Research work and associated discussions with the public have included agricultural production, processing options, economic potential, and regulatory issues. Processing synergies of biomass densification has continued to be explored.

Results
We demonstrated that biomass densification (pelleting) enables reduced severity pretreatment and reduced enzyme loadings in downstream processing. Both will lower cost and/or environmental impact of biomass use.
Beet processing included demonstrating the ability to ferment crushed, whole sugar beets with or without the use of cellulase and pectinase enzymes. The use of enzymes resulted in increases in sugar yield and decreasing in residual solids. A hammer mill/basket press process combination

was developed and tested to extract beet juice from frozen, thawed and fresh beets. Evaluation of potential of energy beets grown in non-traditional environments substantiate that this crop can provide a viable level of feedstock. A storage study of whole, intact energy beets showed very good retention of sugars for refrigerated, aerobic conditions; however, storage cost is a concern.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
402	Engineering Systems and Equipment
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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges
- Other (Death of a key faculty member.)

Brief Explanation

2013 was a good year for producers in ND. Weather extremes occurred at times that had minimal impact on research and Extension programs. Public policy changes were minimal and government regulations were stable. However, due to the tragic loss of a key faculty member in a farming accident, the comprehensive evaluation component was not completed.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Due to changes in personnel, planned program evaluations were not completed in 2013.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

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	50%		50%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	50%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.8	0.0	6.0	0.0
Actual Paid Professional	1.9	0.0	4.6	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**
33480	0	11490	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
33480	0	11490	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
178531	0	528905	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Investigate the biology of pathogenic organisms; 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 food service 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?

eXtension was not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1330	513000	4270	32000

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	4	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	Number of teens reporting changes in food handling practices to reduce risk of foodborne illness outbreaks
2	Number of foodservice and food industry participants in ServSafe, HACCP or other food sanitation courses passing the examination and becoming certified.
3	Number of adult participants in consumer food safety classes reporting intent to change one or more food handling behaviors.

Outcome #1

1. Outcome Measures

Number of teens reporting changes in food handling practices to reduce risk of foodborne illness outbreaks

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	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 Thermy 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. About 800 students participated in the multi-session "Teens" program in the last year.

Results
Since 2003, 8,694 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 87% on the post-test. About 39% of participants had been involved in the preparation of food for the public, and 74% prepare food for themselves or others every week. On the one-month follow up survey, 68% were more careful about cleaning and sanitizing, 43% had shared their knowledge about food safety with others, 77% reported washing their hands more often when preparing food and 40% 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 #2

1. Outcome Measures

Number of foodservice and food industry participants in ServSafe, HACCP or other food sanitation courses passing the examination and becoming certified.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of adult participants in consumer food safety classes reporting intent to change one or more food handling behaviors.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1294

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 three locations in North Dakota and reached 227 participants. About 150 people attended food preservation classes. Educational programs in grilling, food safety and food preservation took place in classroom-type settings. Participants received a food thermometer and educational materials to use at home. Food preservation classes were held in five counties.

Results
The BBQ Boot Camp has reached about 4,200 people during the past five years. Post-test scores showed that participants significantly increased their knowledge and indicated they would change their behavior. Follow-up surveys have shown that 83% used the thermometer they received and 58% had changed their meat purchasing decisions after attending the program. According to evaluations with attendees of hands-on and discussion-based food preservation classes, about 71% planned to make jams/jellies, 33% planned to can fruit, 51% planned to freeze fruit, 58% planned to can salsa and pickles, 34% planned to can vegetables and 21% planned to prepare dehydrated fruit.

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

- Appropriations changes
- Government Regulations
- Competing Public priorities

Brief Explanation

As a result of competing programming and a large number of new staff, we saw declines in the number of Barbecue Boot Camps and food preservation classes. We plan to offer a food preservation training workshop and new materials in the coming year to promote the availability of these resources and programming. More people are accessing their information online, so we have increased our use of Facebook and other media to reach our audiences.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Since 2003, 8,694 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 87% on the post-test. About 39% of participants had been involved in the preparation of food for the public, and 74% prepare food for themselves or others every week. On the one-month follow up survey, 68% were more careful about cleaning and sanitizing, 43% had shared their knowledge about food safety with others, 77% reported washing their hands more often when preparing food and 40% have applied their knowledge when serving food for the public.

Key Items of Evaluation

Teenage food handlers continue to score very low (54%) on the initial examination. This age group, who commonly work in food service operations, are a group that needs ongoing training to prevent foodborne illness outbreaks in commercial settings.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	1.5	0.0
Actual Paid Professional	3.0	0.0	1.4	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**
6543	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
6543	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
203105	0	137898	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 "Go Wild for Fruits and Vegetables" will continue to be used with children. Community-based programs for adults and children, including "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?

eXtension was not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5570	490000	12300	35000

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	2	5	7

V(F). State Defined Outputs

Output Target

<u>Output #1</u>

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.

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1070

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Children in elementary classrooms and afterschool programs have been targeted with nutrition education programming. Multi-lesson curricula that integrate nutrition and fitness concepts for grades four to five have been used statewide.

What has been done
The overall goal of the "Eat Smart. Play Hard. Together." program is to improve knowledge and change behavior among children and their parents through a curriculum used in elementary schools. "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.

Results
From 2005-13, the "Banking on Strong Bones" five-lesson program has reached more than 9,000 children and their families. Students improved their knowledge scores and reported positive attitude and behavior changes toward consumption of dairy products. In the past year, about 1,070 fourth graders participated in "Banking on Strong Bones." On the pre-survey, 40% reported drinking three servings of milk (or dairy) the previous day, compared to 56% on the post-survey. On the pre-survey, 15% reported drinking soda pop every day, compared to 11% on the post-survey. About 91% reported planned to drink more milk.

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2124

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the 2011 Youth Risk Behavior Survey, 11% of North Dakota's high school students were obese. Fruits and vegetables, as part of a healthy diet, are important for optimal child growth, weight management,
and chronic disease prevention. Less than 20% of North Dakota's children (especially low-income children) eat the recommended levels of fruits and vegetables. Motivating children to try fruits and vegetables and then regularly eat fruits and vegetables is a challenge. Behavior change is more likely to occur if children and their families are engaged in role modeling and tracking of their behavior.

What has been done
"On the Move to Better Health" is a five-week school-based curriculum for fifth graders and their families, which aims to increase fruits, vegetables and calcium-rich foods in the diets of children, as well as increase physical activity.

Results
About 40% of families participating in "On the Move to Better Health" set a weekly goal, 42% of participating parents indicated that their family's fruit consumption had increased, 34% reported their family's vegetable consumption had increased, and 20% reported their family's whole-grain consumption had increased. According to post-surveys with more than 2,100 fifth graders in the five-week "On the Move to Better Health" program, about 53% reported increasing the amount of

fruits and vegetables they consumed, 58% reported drinking more milk, 62% reported drinking less soda pop, 64% drank more water, 59% chose healthier snacks, and 58% increased their amount of daily physical activity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

The extremely low Federal capacity support for the obesity planned program meant that NDSU had to rely heavily on state appropriated and grant funding to support the program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A six-week pilot study using an online walking software program was implemented with Extension staff to determine the feasibility of a technology-based walking program. Staff (n=47) received regular emails with educational messages and websites to explore, and they could join teams. More than 96% reported walking for fitness at the end of the program, and 85% reported using a pedometer to measure their steps. About 85% reported an increase in the number of steps from pre- to post-program. All participants reported reading the emails, 48.5% reported exploring the website, and 21% participated in the Facebook page. Several participants reported losing weight and/or lowering their blood cholesterol.

About 40% of families participating in "On the Move to Better Health" set a weekly goal, 42% of participating parents indicated that their family's fruit consumption had increased, 34% reported their family's vegetable consumption had increased, and 20% reported their family's whole-grain consumption had increased. According to post-surveys with more than 2,100 fifth graders in the five-week "On the Move to Better Health" program, about 53% reported increasing the amount of fruits and vegetables they consumed, 58% reported drinking more milk, 62% reported drinking less soda pop, 64% drank more water, 59% chose healthier snacks, and 58% increased their amount of daily physical activity.

Key Items of Evaluation

To continue to thrive and reach new audiences, nutrition educators need to be on the

cutting edge of technology use to complement their traditional educational programming, and reach younger audiences and those in rural, isolated areas.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Citizenship and Leadership Development

☑ Reporting on this Program

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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	0.0	0.0
Actual Paid Professional	10.3	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**
164800	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
164800	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
533842	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Youth will gain skills through 4-H club and summer camp programs. A citizenship event will be held at the state capital and youth participation is planned. Youth will participate in national 4-H events. Parliamentary procedure and leadership resources will be provided to youth groups.

Rural Leadership North Dakota will enroll adult participants in the next leadership development class. Short course leadership programs will be offered regionally in the state.

A regular and ongoing educational program will be implemented using face-to-face educational programming done directly by Extension or in partnership with various agencies and nonprofits. Along with that support through email, web-based questions, and telephone contacts will be in place including the eXtension COP "Entrepreneurs and Their Communities." Written materials will be developed or modified focusing on specific topics identified by small business owners or those working with this group. Finally, traditional media such as newspapers and radio will be utilized along with online tools such as websites and the new social media tools that more and more individuals are using for answers to their questions.

2. Brief description of the target audience

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

The program will work with existing and potential entrepreneurs and small business owners across all of North Dakota. Special emphasis will be given to those in rural areas or involved in agriculture or value-added agriculture activities. Work will also include education, interaction, and involvement with other agencies that work or might be a resource to this identified target audience.

Rural Leadership North Dakota targets emerging agricultural and rural leaders from across the state.

3. How was eXtension used?

One of the NDSU ES state specialists is a co-principal investigator for the eXtension COP "Entrepreneurs and Their Communities." NDSU ES uses the COP as a resource for entrepreneurs receiving training and assistance from Community Vitality program.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4730	2450	137786	77012

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

Year: 2013
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	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	Number of 4-H youth contributing hours in service to others in their community.
2	Percentage of 4-H club members who show improved leadership skills.
3	Number of jobs created or retained as a consequence of small business entrepreneurial education.
4	Number of youth participating in the 2013 National Youth Science Day indicating an increased interest in science.

Outcome #1

1. Outcome Measures

Number of 4-H youth contributing hours in service to others in their community.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	257

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 1900, about 1 in 25 Americans were seniors. In 1990, about 1 in 8 Americans were seniors. From 1990 to 2020, the senior population is projected to increase to 54 million people. So, in 2020, about 1 in 6 Americans will be seniors. Many seniors live alone and may have no family members nearby. Some may have a hard time getting around. Due to their often fixed incomes, keeping up with the increased cost of living can be difficult. Lending hands can help them feel secure and a part of the community.

What has been done
The 2013 ND 4-H Helping Hands Day encouraged districts to provided 1 to 3 project sites that focused on lending a hand to the senior population in their area. Each district created their own opportunities, projects and schedule on the day of their choosing in the fall of 2013.
Districts choose the date that fit best with their county, selected project opportunities that interested their youth, and created opportunities to support local needs around the focus area. From making and handing out senior first aid kits to preparing and delivering meals, five counties in the southwest district, three counties in the northeast and northwest, and one county in the southeast participated in completing Helping Hands Day 2013.

Results
A total of 257 youth and 82 adults spent over 1500 hours serving over 350 community members across the state of North Dakota. Twelve different types of service projects were offered.

The economic value of this service opportunity was estimated using North Dakota's value of volunteer time ($19.18/hour) and amounted to more than $30,000.

4. Associated Knowledge Areas

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

Number of jobs created or retained as a consequence of small business entrepreneurial education.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	474

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many North Dakota communities are facing new population growth. While this is exciting and positive, it creates challenges in areas such as housing, education and other social and physical infrastructure. This has put a great deal of stress on community leaders and residents. NDSU Extension is working to address educational needs of communities through three program areas; leadership development, small and agribusiness entrepreneurship and marketing for the increasing number of value added and rural businesses, and facilitation of community planning and development to help communities inventory and plan for their future.

What has been done

Extension has responded with two new professional positions created to help with the issues ND is facing. The positions have been filled with an Extension manufacturing specialist and a Rural and Agribusiness Enterprise Development Specialist. Two rural communities have also taken part in a pilot project funded by a Rural Futures grant to assist rural communities in marketing their communities to the new North Dakota population.

Results
The Direct Marketing of Food Products Online program, done in cooperation with the University of Nebraska Extension, had over 1000 unique visitors who viewed over 18,000 pages. Training evaluations noted over a 1- point increase, on a 4 point scale, on knowledge gained and indicated the information would be used immediately or sometime soon. The community of Bowden was a direct recipient of support from Extension. Their school closed, grocery store closed and the owner of the meat market passed away. They now have a functioning community owned grocery store and a new meat market which is marketing products all over the state and has created new jobs and a ripple effect of commerce in the community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Number of youth participating in the 2013 National Youth Science Day indicating an increased interest in science.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3550

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
America faces a future of intense global competition with a startling shortage of scientists. In fact, only 18 percent of U.S. high school seniors are proficient in science (NAEP 2005) and a mere five percent of current U.S. college graduates earn science, engineering, or technology degrees compared to 66 percent in Japan and 59 percent in China.

What has been done
To address increased demand for science, engineering and technology professionals, 4-H is working to reach new young people in science programs ultimately anticipating this will lead to more youth being interested in a career in a science related field. Currently, North Dakota 4-H Science programs reach more than 5,500 youth with hands-on learning experiences to prepare the next generation of science, engineering, and technology leaders.

Results
3550 youth participated in the 2013 National 4-H Youth Science experiment, Maps & Apps, related to geospatial science. Of these youth:
- Over 73% indicated that participating in this experiment made them more interested in science.
- Over 66% indicated that participating in this experiment made them want to be a scientist.
- Over 83% indicated that this experiment helped them learn how to use science to solve problems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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 Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

2013 was a good year for the citizens of ND. Weather extremes occurred at times that had minimal impact on research and Extension programs. Public policy changes were minimal and government regulations were stable. The increase in energy extraction in northwestern ND has increased the state coffers, but has also put additional strain on the small communities with their limited capacity reserves located within the "oil patch".

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Through the small business entrepreneurial education program the NDSU Extension interacted with and assisted 32 companies and 61 entrepreneurs. From these interactions, over 30 community based projects and proposals were developed. In conjunction, 21 factory visits were made with the participants. Based on participant direct feedback, this program saved ND manufacturers over $150,000 through process improvements.

Key Items of Evaluation