



# **PLAN OF WORK**

North Dakota State University

North Dakota State University Extension Service  
North Dakota Agricultural Experiment Station

Federal Fiscal Years  
2000-2004

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**Plan of Work**  
**North Dakota State University Extension Service**  
**North Dakota Agricultural Experiment Station**

**A. Introduction**

The NDSU Extension Service and the North Dakota Agricultural Experiment Station (NDAES) are integral units of North Dakota State University, with the main campus at Fargo, North Dakota. The extension service and experiment state serve the citizens of the state through the main campus as well as 53 extension offices located in 52 counties and one Indian reservation, and seven research extension centers located across the state.

This Plan of Work is an overview of the many programs intended to be carried out by the extension service and experiment station during the next five years. This Plan of Work is prepared to meet the requirements of the Agricultural Research, Extension, and Education Ref orm Act of 1998 (AREERA) and the CSREES-USDA “Guidelines for Land Grant Institution Plan of Work.”

**B. Planned Programs**

<u>Function</u>	<u>Goal 1</u>	<u>Goal 2</u>	<u>Goal 3</u>	<u>Goal 4</u>	<u>Goal 5</u>
1862 Extension	Program 1	Program 3	Program 6	Program 10	Program 13
	Program 2	Program 4	Program 7	Program 11	Program 14
		Program 5	Program 8	Program 12	Program 15
			Program 9		Program 16
					Program 17
1862 Research	Program 1	Program 3		Program 10	Program 13
	Program 2	Program 4		Program 11	Program 14
		Program 5		Program 12	Program 15

## **GOAL 1: AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY**

### **Program 1: Competitive and Profitable Crop Production**

#### Statement of Issue

North Dakota agricultural production is important to the domestic vitality of the United States and to its position as a leader in the global economy. North Dakota leads the nation in production of hard red spring wheat, durum wheat, sunflower, barley, all dry edible beans, pinto beans, canola and flaxseed. The state ranks second in production of all wheat, navy beans, oats and honey; and third in sugarbeets. Exports of North Dakota commodities and products are valued at \$1.7 billion. The lead export is wheat (and wheat products) at \$1.2 billion, followed by feed grains (\$151 million), sunflower and oils (\$124 million), dry beans and potatoes (\$91 million) and soybeans and products (\$67 million).

Crop production is critically important to the economy of the Northern Great Plains. Cash receipts from crops provide more than \$3 billion (37%) to the economic base of North Dakota, primarily from wheat (34%), feed crops (12%), oilseeds (14%), dry beans and potatoes (6%) and sugarbeets (5%). More than 25% of North Dakota's population is employed directly in agriculture or in ag-related businesses. A short growing season (120 frost-free days) and low rainfall (12 inches in the northwest corner to about 16 inches in the southeastern corner of the state) limits diversification, yields and cropping potential. Still, North Dakota is one of the most agriculturally diverse states in the nation. More than 40 different crops are grown in the state. Ninety percent of the state is in farmland or ranches, and North Dakota growers realize efficiencies from scale of operations (farms are three times larger than the national average of 470 A.), and from lower input costs. Production expenses of \$80,500/farm are up 20% over the last 5 years. Costs of production include fertilizer and pesticides (33%), repairs and maintenance (16%), fuel (10%) and seed (8%). The human resources engaged in farming are now older (average age 51.4 vs. 50 in 1992), predominately white (99.9%), and male (97.3%).

Issues facing agriculture on the Northern Great Plains were articulated in the report of the 1998 North Dakota Commission on the Future of Agriculture: 1) make (our) agricultural products synonymous with high quality, dominating the premium markets; 2) increase value-added agricultural processing; 3) diversify and increase the value of agricultural production; 4) increase farm and non-farm cooperation that supports thriving rural communities and enhances our natural resources; and 5) create a political, regulatory, economic, trade, financial, and natural resource environment in which (our) producers can compete in the global marketplace.

#### Performance Goals

Following extensive statewide, multi-source inputs, the North Dakota 1998 Committee on the Future of Agriculture identified the following items as important in crop production: Establishing quality standards for crop commodities, producing high quality products, and determining needs for commodity improvements; reducing the impacts of plant diseases and insects; producing commodities with

characteristics for value-added processing; diversifying and increasing the value of crop production by evaluating new crops and appropriate technologies for food, fiber, fuel, and other industrial uses; develop and conserve water resources through efficient irrigation, drought-tolerant crops, and moisture conserving farming practices.

#### Output Indicators

- Release of adapted and improved crop varieties
- Workshops, meetings and schools for growers
- Publications, computer programs and videos on crop production
- Refereed Journal Articles and Regional Research Reports

#### Outcome Indicators

- Adoption of techniques, technologies, or practices by growers and scientists
- Acceptability of products by processing industries
- Adoption of IPM strategies by growers

#### Key Program Components

##### I. Genetic improvement of major crops

A. Introgression, selection, and testing for genetic characteristics of crop plants that improve adaptation to the agroecosystem of the Northern Great Plains.

1. Use traditional breeding methods to develop a menu of improved varieties or germplasm that are released to constituents for their agronomic, industrial, conservation, or other purposes.
  - a. Resistance to biotic and abiotic stressors.
  - b. Improved agronomic, handling, or industrial characteristics.
2. Use novel methods, including molecular procedures, to increase genetic diversity of major crop species and/or introduce genes for specific purposes.
3. Reciprocally share genetic stocks with regional, national, and international partners, especially other land-grant institutions and the USDA - ARS, for the purposes of describing the range of adaptation of potentially useful materials, and for increasing genetic diversity.

B. Determine the fundamental characteristics of crop plants, their competitors (weeds), predators (insects), parasites (diseases) and beneficial symbionts.

1. Describe important genetic, physiological, biochemical, or morphological features of plants, plant products, and foods/feeds/fuels from plants.
2. Describe life cycles, behavioral characteristics, biological adaptations and population dynamics of insects; fungal, bacterial, viral and phytoplasma plant pathogens, and weeds.
3. Develop methods for improving and evaluating natural dinitrogen fixation and nutrient availability for crop plants.



C. Assess Problems

1. Catalog and map the nature and magnitude of problems.
2. Determine impacts of problems (losses and/or restrictions).
3. Develop useful predictors for problems.
4. Chronicle introduction and spread of emerging crop pest problems.

II. Assessment of minor crops

- A. Test for adaptation and assess feasibility for commercial production of new crop species that may capitalize on export potential, fill niche or developing domestic market demands, or provide benefit to other crops in cropping systems.
- B. Identify and characterize useful industrial products from minor crops that may enhance their value in crop systems.
- C. Describe and ameliorate production problems (nutrients, diseases, insects, weeds, harvest losses, storage problems) that would discourage or limit economic production of new crops.
- D. Annually increase the research and knowledge base available from CSREES partners and cooperators on new and value-added commodities and products in U.S. agriculture.

III. Develop management strategies to sustain crop productivity

- A. Describe nutritional and other edaphic factors that influence sustainable crop production.
- B. Describe and assess the biological interactions that affect the cycling of nutrients, viability of beneficial and harmful organisms in the soil, or that result in benefits (nitrogen fixation biological controls, mycorrhizae) to individual crops or sustained production.
- C. Evaluate pesticide chemistries, application methodologies, modes of action, timing, or other attributes for efficiency and compatibility with integrated pest management and reduction of harmful impacts to the environment while reducing input costs to the maximum practical extent.
- D. Evaluate traditional and innovative farming practices including tillage, irrigation, rotation, grazing patterns that affect the physical, biological, and economic sustainability of crop production.

IV. Annually increase the agricultural producer, consumer, government and social sector awareness, understanding, and information regarding agricultural systems.

- A. Describe new commodities, products, practices, and problems to client groups.
- B. Increase understanding of global competitiveness and opportunities in crop-based resources.
- C. Integrate new understandings of agricultural production, consumer practices, policy changes, and social changes into university classes or curricula.

Internal and External Linkages

Growers are a major linkage as they continually evaluate, use, accept/reject varieties, technologies and management techniques and give feedback directly or indirectly to NDSU researchers and extension staff. Some growers participate in “on-farm” trials. Seedstocks, county crop improvement associations and the State Seed Department are the primary conduit for increasing and making public varieties available, and insuring a reliable supply of quality seed. All provide feedback to researchers. USDA - ARS provides important germplasm and fundamental understanding of genetics/pathogens/insects for cereals, sunflower, sugarbeet and provides resources for interactions of cultivated and native species. U.S. Wheat and Barley Scab Initiative is a multi-state consortium of universities and other units dedicated to management of cereal scab disease. Collaborative studies on insects and disease pests of sugarbeet, canola and sunflower as well as joint publications with NDSU on sugarbeet diseases are conducted with the University of Minnesota Crookston. Joint positions in Potato Extension, Sugarbeet Extension, weed control, soybean and corn extension are funded with the University of Minnesota, St. Paul. Joint efforts in sugarbeet pathology in the Yellowstone River Valley are conducted in cooperation with Montana State University. The Montana Experiment Station at Sydney, MT, and the NDSU Research Extension Center at Williston are headed by a single individual. A common data base for diagnostic laboratories is held in conjunction with South Dakota State University and barley, wheat and other crops are exchanged and evaluated, some for joint release.

Target Audiences

The target audiences are crop producers, consultants and other agri-business who work with crop producers and industries which utilize crops produced in the state. Particular attention will be given to the needs of small and mid-sized crop producers as these producers are being affected the most by the structural and technological changes taking place in agriculture. Basic and applied scientific advances are targeted to scientists in a number of disciplines. Emphasis will also be given to working with minority producers on the Indian reservations.

Program Duration

This program will continue for the five-year life of the Plan of Work.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	1770	1770	1770	1770	1770
	State	2480	2480	2480	2480	2480
		55	55	55	55	55
1862 Research (\$)	Hatch	1206	1206	1206	1206	1206
	State	1961	1961	1961	1961	1961
		28	28	28	28	28

Education and Outreach Programs



A major extension program is presently underway on new and alternative crops. This program is conducted in response to crop producers searching for new or alternative crops to increase the profitability and diversity in their present cropping system. Crop disease problems, low market prices, changes in the farm bill and fluctuations in world global markets are driving forces behind this interest. The research base for this educational program is generated by the NDAES, both at the main station in Fargo and at the six research extension centers which conduct cropping research. The research base is also generated in cooperation with the Land Grant Universities in neighboring states. Another major extension program is focused on improving the production and profitability from the production of major crops. These involve information on varieties developed by NDSU and other Land Grant Universities as well as the research base developed from variety trials of public and private varieties. This program includes information on crop pest management, much of which is developed through applied research at the NDSU main station and the six research extension centers doing cropping research.

Goal 1: An Agricultural System that is Highly Competitive in the Global Economy

## **Program 2: Competitive and Profitable Animal Production**

### Statement of Issues

The economies of North Dakota and the Northern Great Plains are very dependent on agriculture, and the region's agricultural productivity is an important component of American agriculture. Livestock agriculture is currently a critical portion (about 1/3 of the total) of the agriculture in the state and region. Livestock agriculture offers great potential for adding value to the crops that are produced in the region and in adding diversity to existing agriculture operations. Both activities will add stability to the state's and region's agricultural economy and will allow agricultural producers to cope better with the twin problems of fluctuating commodity markets and extreme annual fluctuations in weather.

### Performance Goals

The goal of NDSU's animal production program is to increase efficiency and profitability of livestock production and to improve conservation management of the private (95%) and public (5%) range resources in North Dakota. This includes beef, dairy, lamb, wool, swine, and bison production and includes conservation management of the state's rangeland resources for livestock and wildlife production and for long-term conservation goals.

### Output Indicators

Scientific journal articles, experiment station bulletins, extension circulars, workshops and programs for producers, training sessions for extension specialists, release of computer software to aid in animal agricultural decision making, and outreach through popular media (print, radio, TV).

### Outcome Indicators

Acceptance and implementation of new and improved livestock, forage, and range management practices by producers and land managers that will lead to efficient and profitable production of livestock in North Dakota and add stability to North Dakota's agriculture industry as a whole.

### Key Program Components

Increased efficiency and profitability of animal production will be realized through several activities: improved disease management, improved reproduction management, improved nutrition management, improved genetics management, increased usage of low-cost range and domestic forages in ruminant production systems, increased uses of crop processing and production coproducts and byproducts in growing and finishing animals, improvement of livestock product marketing capabilities, improved animal source food safety, improved animal waste management, and improved integration of all production factors in livestock production systems that will result in better livestock management decision making.

### Internal and External Linkages

This program involves the Department of Animal and Range Sciences, Department of Veterinary and

Microbiological Sciences, Department of Agricultural Economics, Department of Plant Sciences, Department of Agricultural and Biosystems Engineering, Carrington Research Extension Center, Dickinson Research Extension Center, Central Grasslands Research Extension Center, Hettinger Research Extension Center, USDA/ARS/Northern Plains Research Center, Mandan, USDA/ARS/Human Health and Nutrition Center, Grand Forks, USDA/ARS/Biosciences Research Laboratory, Fargo. In addition, the program involves several private livestock producers and private companies that cooperate in our research programs.

Target Audiences

Results of the animal production program will be shared with all producers of mammalian livestock in North Dakota and the Northern Great Plains and with the livestock industry as a whole. In addition, the results of the range and forage research will be shared with all private and public land managers. And all of the results will be shared with researchers and educators in other parts of the country and world.

Program Duration

This program will continue for the five - year life of the plan of work.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	387	387	387	387	387
	State	543	543	543	543	543
		13	13	13	13	13
1862 Research (\$)	Hatch	422	422	422	422	422
	State	688	688	688	688	688
		10	10	10	10	10

Education and Outreach Programs

North Dakota's animal agriculture research and extension programs are closely linked within the academic departments on campus (includes researchers, teachers, and extension specialists) and the research and extension centers distributed throughout the state. Additionally, the departments and centers work closely together. Nearly all of the animal production and range science extension specialists devote a portion of their time to research and all work closely with scientists that have research appointments. To a large degree, the specific topics for research in animal production originate from needs identified through extension and outreach programs and through the interaction of the departmental scientists with the scientists at the research centers.

**GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM**

**Program 3: Food Safety - Foodborne Illnesses**

### Statement of Issue

Foodborne Illness is responsible for approximately 9000 deaths and millions of illnesses in the United States each year according to a commonly used estimate. Among the most vulnerable are the elderly, the very young and people with compromised immune systems. The types of foods associated with foodborne illness have expanded to include atypical foods such as alfalfa sprouts, melons, and other types of fresh produce.

North Dakota has had a number of publicized cases of foodborne illness including hepatitis, E. coli O157:H7 and others. For example, over 90 people were sickened in a community-based setting in North Dakota in 1999, the confirmed source being roast beef contaminated with C. perfringens due to improper cooling. Over 300 students in a North Dakota school were sickened in 1999 in a separate incident.

In addition, many North Dakotans also are becoming food processing entrepreneurs and starting small-scale food processing businesses in their homes and other settings. Since North Dakota does not have a resident Process Authority, many of these products have not been tested for safety.

### Performance Goal

To improve the detection of foodborne pathogens and to develop pre- and post-harvest processes to prevent contamination of food and assure a quality product all the way from farm to fork. To increase the knowledge of food processors and preparers of methods to prevent foodborne illnesses.

#### Output Indicators

- Improve detection of pathogenic microorganisms and processes to prevent harmful contamination of food by such pathogens.
  - Number of peer-reviewed journal articles published
- Research-based extension circulars produced and distributed
- Reaction of professionals/consumers to their requests for information and training relating to pathogenic micro-organisms and foodborne illnesses.

#### Outcome Indicators

- Utilization of information by food producers (animal/vegetable) producers, processors, preparers and consumers in improvement of the quality and safety of food products.
- Decrease in foodborne illnesses.

### Key Program Components

- Research in the area of food safety at NDSU is strong and involves nationwide and international collaborations. For instance, NDSU is an active participant in the National Alliance for Food Safety. Our research covers many disciplines and includes veterinary microbiologists, food microbiologists, immunologists, economists, engineers, food scientists and nutrition specialists. Many projects are collaborative in nature and look at detection and prevention of infectious disease caused by food safety pathogens in live animals; identification of microbial contamination using fast and non-destructive methods; risk/cost/benefit analysis of food safety issues and potential solutions/actions; physical treatment of foods to render them safe for human consumption; development of processes and procedures to prevent contamination of food during production, processing, distribution, and use/consumption; and study of the contagious, toxic, or immunologic bases of food borne illness.
- Identification and assessment of the effectiveness of various agents, including common acidulants, used to reduce microbial counts on fresh produce.
  - Conduct laboratory and statistical analysis.
  - Develop extension/research publication(s) and disseminate information to foodservice establishments and consumers, as appropriate.
- Assessment of the risks associated with foods commonly preserved in North Dakota homes.
  - Assess acidity of tomato varieties grown in North Dakota and the acidity of commonly - used salsa formulations.
  - Identify risks associated with Internet-based non-USDA food preservation formulations (i.e. canned quick bread). Conduct inoculated-pack studies.
  - Develop extension/research publication(s) and disseminate information to consumers and others, as appropriate.

### Internal and External Linkages

- These research and extension programs are collaborative efforts of faculty from the departments of Veterinary and Microbiological Sciences, Animal and Range Science, Food and Nutrition, Agricultural and Biological Engineering, Cereal Science, and the Institute for Business and Industry Development, together with extension specialists and county staff.
- External linkages include collaborative educational projects with South Dakota State University, the North Dakota Department of Health and the National Food Safety Alliance of Universities.

### Target Audiences

Target audiences include food processors and their employees, meat processors and their employees, food service managers and employees and agricultural producers.

### Program Duration

These programs will continue for the five-year plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	38	38	38	38	38
	State	52	52	52	52	52
		1	1	1	1	1
1862 Research (\$)	Hatch	125	125	125	125	125
	State	205	205	205	205	205
		3	3	3	3	3

Education and Outreach Programs

The extension program is based on a strong linkage with departmental research faculty.

## Goal 2: A Safe and Secure Food and Fiber System

### **Program 4: Food Safety - HACCP**

#### Statement of Issue

About half of the consumer's food dollar is currently spent on food eaten away from home (USDA, 1993). Nationally, foodservice establishments are linked with the most food-related outbreaks. In North Dakota, food-related businesses represent a growing sector of the economy; however, despite this growth, legislative action changed the required number of inspections from "at least once per year" to "at least once every two years." Some health districts, however, conduct inspections on a more frequent basis than what is required by law.

North Dakota has had a number of publicized cases of foodborne illness including hepatitis, *E. coli* O157:H7 and others. For example, over 90 people were sickened in a community-based setting in North Dakota, the confirmed source being roast beef contaminated with *C. perfringens* due to improper cooling.

Hazard Analysis Critical Control Point (HACCP) methodology has been successfully used in the food industry to assure and document safe food handling practices. HACCP programs are required for the seafood industry and much of the meat industry, and other industries such as the produce industry are applying similar principles.

Along with the increase in commercial foodservice operations, greater numbers of children and the elderly are participating in daycare. Many North Dakotans also are becoming food entrepreneurs and starting small-scale food processing businesses from their homes or other settings.

Community dinners through nonprofit organizations, such as fraternal organizations, congregations and 4-H clubs, also remain popular. The volunteer food handlers are often untrained in quantity food production and handling. All of these trends present unique food safety concerns.

#### Performance Goals

- Increased knowledge of food safety/HACCP principles and implementation among foodservice managers, meat processors, sanitarians and food processing entrepreneurs.
- Increased collaboration among Extension agents, sanitarians, commodity groups and food distributors in providing food safety training.
- Increased knowledge and awareness of safe food handling practices among consumers, daycare providers and volunteer food handlers.
- Changes in food handling practices to reduce risk of foodborne illness outbreaks.

### Output Indicators

- HACCP training workshops will be offered in collaboration with extension agents and the North Dakota Department of Health. Workshops will target foodservice and food processing employees in cities across North Dakota. The NDSU-produced HACCP video will be marketed via the Internet and through county Extension Service offices statewide (99 -2000).
- An educational package will be developed for use in training volunteer food handlers (99-2000).
- Materials from the national “Fight BAC” campaign will be distributed to county extension service offices for use in school and community settings. A series of food safety lessons for elementary students will be completed and distributed (99 -2000).
- Food preservation circulars will be updated, and a lesson plan will be developed for use in workshops (99-2000).
- Food safety research updates will be provided to staff in written form, in meetings, by IVN training and by conference calls. Information releases and public service announcements on consumer food safety issues will be provided to staff.
- The NDSU Extension web site food and nutrition links will be updated . Interactive CD-ROM and other computer-based learning tools will be identified for use in programming.

### Outcome Indicators

- Pre/post-testing will be used at HACCP training workshops to measure increased knowledge, awareness and intentions to change behavior.
- Six-month follow-up surveys on changed practices will be mailed to participants in HACCP workshops.
- Pre/post tests will be used to measure increased knowledge, awareness and intentions to change behavior among participants in volunteer food handler training and food preservation training.

### Key Program Components

- HACCP training for foodservice and meat processing managers and employees.
- Revise educational materials based on changes in North Dakota law.
- Conduct training programs in cities throughout North Dakota, with cooperation from the North Dakota Department of Health and marketing by county extension service staff.
- Food safety testing and training for small food processors and entrepreneurs.
- Identify existing campus-based and private food safety resources. Identify training needs of food processors and entrepreneurs.
- Develop a basic food safety testing service.
- Develop/adapt a web-based food processing guide for North Dakota food processing entrepreneurs. Disseminate through county extension offices and via the Internet.



- Develop handouts and lesson plans based on the most current issues in food safety, including completed research on produce washing treatments.
- Adapt materials for teens employed in foodservice establishments.

Internal and External Linkages

- These research and extension programs are collaborative efforts of NDSU Extension specialists and county staff, the NDSU Department of Food and Nutrition faculty, NDSU Department of Animal and Range Sciences faculty, NDSU Institute for Business and Industry Development staff and other campus-based faculty.
- External linkages include collaborative educational projects with South Dakota State University Extension Service and the North Dakota Department of Health/Division of Food and Lodging.

Target Audiences

Target audiences include North Dakota foodservice managers and employees, meat processing managers and employees, small food processing companies/entrepreneurs and consumers.

Program Duration

These programs will continue for the five - year plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	250	250	250	250	250
	State	350	350	350	350	350
		13	13	13	13	13
1862 Research (\$)	Hatch	42	42	42	42	42
	State	68	68	68	68	68
		1	1	1	1	1

Education and Outreach Programs

The extension program is based on research occurring at North Dakota State University, as well as research from other institutions.

## Goal 2: A Safe and Secure Food and Fiber System

### **Program 5: Pest Management**

#### Statement of Issue

The value of North Dakota crops to the nation and region were specified as a crop production issue in Goal 1 - Program 1. However, in many cases the maximum potential value of the crops we produce is limited by pests. A sustainable approach to pest management combines biological, cultural, physical, and chemical tools to regulate pest populations while minimizing economic, environmental, and human health risks. This approach falls under the term integrated pest management (IPM). IPM should be considered as a component of sustainable crop production. IPM combines essential aspects of efficacy and safety to meet expectations of those who produce and market commodities and of the general public.

The goal of the national IPM initiative is to insure the future profitability, sustainability, and competitiveness of U.S. agriculture for the benefit of America's farmers and consumers. The specific goal of the initiative is to implement IPM in cropping systems on 75% of the nation's crop acres. This goal is supported by North Dakota State University Experiment Station and Extension Service.

Pest control represents approximately 34 percent of a farmer's variable crop production costs and pests continue to cause crop losses of 10 to 30 percent even with current pest control strategies. In addition to existing pests, farmers are continually challenged by new pests such as Karnel bunt and by a resurgence of pests such as *Fusarium* on small grains and orange wheat blossom and sunflower midges. These and other pests not only reduce profitability but often threaten export markets.

#### Performance Goal

To create and extend knowledge leading to safe, effective, and economical pest management systems for North Dakota crops.

#### Output Indicators

- Release of adapted and improved crop varieties
- Workshops, meetings and schools for growers
- Publications, computer programs and videos on crop production
- Refereed Journal Articles and Regional Research Reports

#### Outcome Indicators

- Adoption of techniques, technologies, or practices by growers
- Acceptability of products by processing industries
- Adoption of IPM strategies by growers

### Key Program Components

#### I. Pesticide Management.

- A. Efficient pesticide use. A major component of any integrated pest management system is to use pesticides only when warranted and only when other approaches are uneconomical or inefficient.
  - 1. A shift away from prophylactic use of pesticides to use only as needed.
  - 2. Development of sampling protocols and economic injury levels to justify pesticide use.
- B. Cultural pest control. Use of on-farm management techniques to make conditions less favorable for pest development.

#### II. Biological Control. Use of appropriate biological agents to control insect and weed pests in North Dakota. The goal is the establishment of self-perpetuating populations of biological control organisms that will maintain pest populations below economically damaging levels.

- A. Identification of potential biological agents in collaboration with appropriate state and federal (USDA-ARS, USDA-APHIS) agencies.
- B. Release of potential biological agents in collaboration with appropriate state and federal (USDA-ARS, USDA-APHIS) agencies.
- C. Implementation of release strategies and follow up studies to assess success and long-term consequences of the releases.

#### III. Genetic Resistance to Pests.

- A. Identification of sources of resistance to insect and disease pests of North Dakota crops.
  - 1. Gene sources may be from within the same, related, or distant species, or from non-related species that require molecular techniques to incorporate the gene(s) into adopted germplasm.
- B. Characterization of the functional and genetic traits of the resistance genes to facilitate efficient breeding techniques and to increase the durability of the resistance.
- C. Development of insect and disease-resistant crop varieties and germplasm.

#### IV. Preventative Pest Management.

- A. Monitoring of changes in cropping practices or in pest adaptation to control methodologies that will alter pest ability to cause economic damage to North Dakota crops.
- B. Being aware of potential alien or exotic pests.

### Internal and External Linkages

- These research and extension programs are collaborative efforts of NDSU Extension specialists and county staff, the NDSU Department of Food and Nutrition faculty, NDSU Department of Animal and Range Sciences faculty, NDSU Institute for Business and Industry Development staff and other campus-based faculty.
- External linkages include collaborative educational projects with South Dakota State University

Extension Service and the North Dakota Department of Health/Division of Food and Lodging.

Target Audiences

The target audiences are agriculture producers, consultants, and other agri-businesses who work with agricultural producers.

Program Duration

These programs will continue for the five - year plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	138	138	138	138	138
	State	192	192	192	192	192
		4	4	4	4	4
1862 Research (\$)	Hatch	126	126	126	126	126
	State	204	204	204	204	204
		3	3	3	3	3

Education and Outreach Programs

The extension and outreach programs are closely linked. Researchers participate in outreach activities, and extension specialists participate in applied research.

### **GOAL 3: A HEALTHY, WELL-NOURISHED POPULATION**

#### **Program 6: Physical Activity and Health Habits**

##### Statement of Issue

In 1996, the United States Surgeon General issued a report regarding the physical activity and health habits of citizens in the United States. From that report we learned that during the past decade the number of children in the US who are overweight has more than doubled. It is now estimated that approximately 11% of American children are overweight and an additional 14% have a body mass index between the 85th and 95th percentiles, which puts them at increased risk for becoming overweight. Further, 60% of high school females and 24% of high school males are trying to lose or control their weight. In North Dakota, 51% of 7th and 8th grade females and 47% of 9th through 12th grade females are dieting to maintain their current weight or lose weight. Of these students, 12% use laxatives or vomit to control their weight. And, 50% of adult females and 25% of adult males are trying to lose or control their weight.

With regard to physical activity, nearly 50% of American youth are not vigorously active on a regular basis and one-fourth of American young people ages 12-21 report no vigorous physical activity. Participation in all types of physical activity declines as age and grade in school increases. In North Dakota, 89% of 7th graders, 59% of 10th graders, and 27% of 12th graders attend physical education class at least once a week. That these patterns track to adulthood is supported by the current estimate that approximately one-fourth of the adult US population fails to engage in physical activity during their leisure time while only 15% regularly engage in vigorous physical activity during leisure.

It is estimated that inactivity and poor diet cause at least 300,000 deaths a year in the United States. Only smoking and the use of tobacco products causes more preventable deaths.

##### Performance Goal

Increase awareness of and participation in appropriate physical activity and adherence to healthy methods of maintaining, gaining or losing weight among North Dakota children and youth.

##### Output Indicators

Researchers in the Department of Health, Physical Education and Recreation at NDSU have used new technologies (heart rate monitors and motion sensors) and developed new educational materials (fitness education pyramids and caloric expenditure target) which have been used in various research projects involving public school children and youth in and around the Fargo-Moorhead area.

##### Outcome Indicators

This research will result in increased knowledge regarding appropriate physical activity and caloric expenditure, increased participation in physical activity among children and youth, and a healthier population.

Key Program Components

Research projects will focus on: assessment of caloric expenditure and heart rate intensity of children and youth engaged in physical education/health activities, comparisons of various teaching styles and models relative to caloric expenditure and heart rate intensity, and the effects of calorie education and heart rate education on caloric expenditure and heart rate intensity during physical education/health.

Internal and External Linkages

Partnerships will continue between the Department of Health, Physical Education and Recreation and the Fargo Public Schools, specifically Agassiz Middle School and Fargo South High School.

Target Audiences

We will focus on public school physical education/health teachers in the state of North Dakota and in Minnesota schools close to the Fargo-Moorhead area. Demonstrations and publications related to this research will educate teachers relative to research findings and in the use of technologies such as heart rate monitors and motion sensors and educational materials such as the fitness education pyramids and the caloric expenditure target.

Program Duration

This program will continue for the five years of this plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	23	23	23	23	23
	State	31	31	31	31	31
		0.6	0.6	0.6	0.6	0.6
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0
		0	0	0	0	0

Education and Outreach Programs

The extension program is supported by research at NDSU and other institutions.

### Goal 3: A Healthy, Well-Nourished Population

#### **Program 7: Nutrition and Health**

##### Statement of Issue

Many of the chronic diseases such as heart disease, cancer and diabetes have direct correlations to diet and physical activity. Despite the evidence supporting consumption of a varied diet with less than 30 percent of total calories from fat and regular, moderate physical activity, Americans in general and North Dakotans in particular are not meeting all the national Healthy People 2000 goals.

Among the draft Healthy People 2010 objectives for prevention and control of chronic diseases are the following: to increase to at least 75 percent the proportion of people aged 2 and older who meet the Dietary Guidelines' minimum average daily goal of at least five servings of vegetables and fruits; to increase to at least 75 percent the proportion of people aged 2 and older who meet the Dietary Guidelines' average daily goal of no more than 30 percent of calories from fat; to increase to at least 75 percent of people aged 2 and older who meet the Dietary Guidelines' goal of less than 10 percent of calories from saturated fat; to increase to at least 60 percent of the population the prevalence of healthy weight (BMI 19 to 25) among all people aged 20 and older; and to increase to 30 percent of people aged 18 and older who engage in regular, preferably daily, sustained physical activity for at least 30 minutes per day.

##### Performance Goals

As a result of participation in Extension Food and Nutrition programs, participants will show:

- Increased knowledge and awareness of the importance of variety in the diet coupled with reduced fat consumption in reducing the risk of chronic diseases.
- Increased knowledge and awareness of the importance of moderate physical activity in reducing the risk of chronic diseases.
- Behavioral changes regarding consumption of a varied diet and moderate physical activity on a regular basis.
- Increased knowledge and awareness of the symptoms, treatment and long-term effects of diabetes.

##### Output Indicators

- 5 Plus 5 Coalitions of NDSU Extension personnel, North Dakota Department of Health Nutritionists, hospital/wellness center staff, commodity group representatives, Parks and Recreation staff, school representatives, and community members will promote variety in the diet (particularly 5 A Day), decreased fat consumption and regular moderate physical activity in a variety of settings including grocery stores and worksites. The community plans will be established at the local level and will use/adapt materials (lesson plans, handouts, press releases, etc.) developed by NDSU Extension Specialist(s) and North Dakota Department of Health staff and other members of the North Dakota Healthy Heart Council.
- In-services and printed summaries of recent research in physical activity and human nutrition

will be provided to extension agents and other collaborators. Information releases, public service announcements and other tools to support the 5 Plus 5 program will be developed/adapted.

- Diabetes educational materials (Part 2) will be distributed for use with Family and Community Educator organizations and others throughout North Dakota.

#### Outcome Indicators

- Pre/post surveys to determine change in knowledge and awareness of the importance of a varied diet and moderate physical activity will be administered in multi-session classes.
  - Records of self-reported fruit and vegetable consumption and physical activity will be evaluated and summarized to determine changes in behavior. Participant comments/success stories also will be summarized.
- Pre/post survey to determine change in knowledge and awareness of diabetes.

#### Key Program Components

- Lesson plans, handouts, public service announcements and information releases will be developed based on research conducted on herbs and other dietary supplements; fad diets/size acceptance; evaluation of Internet resources; and current recommendations regarding nutrition throughout the life cycle (particularly children and the elderly) will be developed/adapted.
- Lesson plans, handouts, public service announcements and information releases will be developed based on current issues in nutrition and food selection and purchasing.

#### Internal and External Linkages

North Dakota Dietetic Association  
% Sandy Walen, NDDA Executive Secretary  
2603 Olive St  
Grand Forks, ND 58201

North Dakota Nutrition Council  
% Marie Williams (Membership Chair)  
Lake Region WIC  
Ramsey County Courthouse  
Devil's lake, ND 58301

Fargo-Moorhead Dietetic Association  
P.O. Box 1477  
Fargo, ND 58107

Dairy Council of Upper Midwest  
Bismarck, ND 58501

Fargo Cass Public Health  
401 3rd Ave N  
Fargo, ND 58102

Grand Forks Public Health  
112 S 5th St.  
Grand Forks, ND 58201

ND State Department of Health  
State Capitol  
600 E Boulevard Ave  
Bismarck, ND 58505

Cardiovascular Disease Prevention Program  
ND Department Health  
600 E Blvd Ave  
Bismarck, ND 58505

WIC  
2400 Broadway  
Bismarck, ND 58501

Community Wellness Centers

Public School Systems

Meals on Wheels and Congregate Meal Sites



Lutheran Social Services of North Dakota  
1325 11 St. South  
Fargo, ND 58103

ND Beef Commission  
4023 State Street  
Bismarck, ND 58501

Child Nutrition Programs  
600 E Boulevard Ave  
State Capitol  
Bismarck, ND 58505

American Diabetes Association,  
North Dakota Affiliate  
Box 5234, 101 North Third Street  
Grand Forks ND 58206-5234

Richland County Health Department  
413 3rd Ave N  
Wahpeton, ND 58075

Indian Health Services  
Parklawn Building, Rm 6-05  
5600 Fishers Lane  
Rockville MD 20857

Public Health Nutrition  
IHS Diabetes Program  
Box 400  
New Town, ND 58763

United Tribes Technical College  
3315 University Drive  
Bismarck ND 58504

Diabetes Control Project  
ND State Dept health  
600 E Boulevard  
Bismarck, ND 58515

Standing Rock Sioux Reservation  
Tribal Council  
PO Box D  
Fort Yates ND 58538

Kellogg Foundation Visions for Change  
One Michigan Avenue East  
Battle Creek, MI 49017-4058

Targeted Audience

Individuals and families residing in North Dakota. The diabetes work will focus on North Dakota's Indian population.

Program Duration

These programs will continue for the five - year plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	19	19	19	19	19
	State	26	26	26	26	26
		0.5	0.5	0.5	0.5	0.5
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0
		0	0	0	0	0

Education and Outreach Programs

The extension program is based on research at out-state institutions.

### Goal 3: A Healthy, Well-Nourished Population

#### **Program 8: Nutrition - Children and Adults**

##### Statement of Issue

Most health care dollars are spent on treatment rather than on prevention. In 1996, heart disease accounted for nearly one-third of all deaths in North Dakota, followed by cancer (23 percent of deaths) and stroke (8 percent of deaths) according to data from the North Dakota Department of Health. Cardiovascular disease costs North Dakota over \$300 million per year, or about \$500 for each person in North Dakota. Cancer results in one in four deaths in the U.S. and costs the nation over \$100 billion yearly.

North Dakotans are falling short of the recommendations for a healthy diet consisting of a variety of foods and no more than 30 percent of calories from fat in the total diet. Despite research on the health benefits of fruits and vegetables, particularly for reducing the risk of cancer, less than 20 percent of North Dakota adults consume five or more servings of fruits and vegetables a day.

The incidence of diabetes in North Dakota also presents a public health concern. About 2,000 new cases of diabetes will occur annually in North Dakota based on the national diabetes incidence pattern, according to the North Dakota Department of Health. About 16 percent of North Dakotans have diabetes at the time of death, and about one-third of Native Americans over age 64 on North Dakota reservations develop diabetes. In 1995, about \$79 million was spent on direct hospitalization of patients with complications of diabetes. In North Dakota, an estimated \$262 million is spent on diabetes care annually. Native Americans develop Type 2 diabetes at a rate of four to five times greater than the rest of the U.S. population.

Overweight status and physical inactivity are among the contributing factors for cardiovascular disease and other chronic illnesses. About one-third of North Dakotans are overweight according to the North Dakota Behavioral Risk Surveillance studies. According to the Surgeon General's 1995 report, all Americans should aim for 30 minutes of moderate physical activity on five or more days each week. Although physical activity has been shown to provide protection from heart disease, diabetes, cancer and other chronic diseases and conditions such as high blood pressure, Americans in general and North Dakotans in particular are predominantly sedentary. About one-third of North Dakotans are inactive during leisure time.

##### Performance Goals

As a result of participation in Extension Food and Nutrition programs, participants will show:

- Increased knowledge and awareness of the importance of variety in the diet coupled with reduced fat consumption in reducing the risk of chronic diseases.
- Increased knowledge and awareness of the importance of moderate physical activity in reducing the risk of chronic diseases.
- Behavior changes regarding consumption of a varied diet and moderate physical activity on a

regular basis.

- Increased knowledge and awareness of the symptoms, treatment and long-term effects of diabetes.

#### Output Indicators

- 5 Plus 5 Coalitions of NDSU Extension personnel, North Dakota Department of Health Nutritionists, hospital/wellness center staff, commodity group representatives, Parks and Recreation staff, school representatives, and community members will promote variety in the diet (particularly 5 A Day), decreased fat consumption and regular moderate physical activity in a variety of settings including grocery stores and worksites. The community plans will be established at the local level and will use/adapt materials (lesson plans, handouts, press releases, etc.) developed by NDSU Extension Specialist(s) and North Dakota Department of Health staff and other members of the North Dakota Healthy Heart Council.
- In-services and printed summaries of recent research in physical activity and human nutrition will be provided to extension agents and other collaborators. Information releases, public service announcements and other tools to support the 5 Plus 5 program will be developed/adapted.
- Diabetes educational materials (Part 2) will be distributed for use with Family and Community Educator organizations and others throughout North Dakota.

#### Outcome Indicators

- Pre/post surveys to determine change in knowledge and awareness of the importance of a varied diet and moderate physical activity will be administered in multi-session classes.
- Records of self-reported fruit and vegetable consumption and physical activity will be evaluated and summarized to determine changes in behavior. Participant comments/success stories also will be summarized.
- Pre/post survey to determine change in knowledge and awareness of diabetes.

#### Key Program Components

- Lesson plans, handouts, public service announcements and information releases will be developed based on research conducted on herbs and other dietary supplements; fad diets/size acceptance; evaluation of Internet resources; and current recommendations regarding nutrition throughout the life cycle (particularly children and the elderly) will be developed/adapted.
- Lesson plans, handouts, public service announcements and information releases will be developed based on current issues in nutrition and food selection and purchasing.

Internal and External Linkages

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% Sandy Walen, NDDA Executive Secretary  
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State Capitol  
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Wahpeton, ND 58075

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Box 400  
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600 E Boulevard  
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4023 State Street  
Bismarck, ND 58501

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Box 5234, 101 North Third Street  
Grand Forks ND 58206-5234

Indian Health Services  
Parklawn Building, Rm 6-05  
5600 Fishers Lane  
Rockville MD 20857

United Tribes Technical College  
3315 University Drive  
Bismarck ND 58504

Standing Rock Sioux Reservation  
Tribal Council  
PO Box D  
Fort Yates ND 58538

Kellogg Foundation Visions for Change  
One Michigan Avenue East  
Battle Creek, MI 49017-4058

Targeted Audience

Individuals and families residing in North Dakota. The diabetes work will focus on our Indian population.

Program Duration

These programs will continue for the five - year plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	23	23	23	23	23
	State	31	31	31	31	31
		0.6	0.6	0.6	0.6	0.6
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0
		0	0	0	0	0

Education and Outreach Programs

The extension program is based on ongoing studies written in North Dakota and other states.

### Goal 3: A Healthy, Well-Nourished Population

#### **Program 9: Food Security Only One Issue for Limited Resource Audiences**

##### Statement of Issue

North Dakota's EFNEP program is offered in seven locations: three urban centers and four Native American reservations. Site selection is based on poverty figures and criteria affected by poverty. The FNP Program is in 43 locations in North Dakota.

The 1995 poverty estimates for North Dakota indicate that 11.8% of the total population live in poverty.

In 1997, the estimated per capita income in the U.S. was \$25,298. In North Dakota, the per capita income was \$20,213 during the same time period. (U.S. Department of Commerce.) The median family income for Indians on reservations was \$13,700. (U.S. Bureau of the Census.)

The number of Native Americans in North Dakota grew from 25,917 in 1990 to 27,313 in 1994. Native Americans make up 4% of the state's population and have a poverty rate twice as high.

There are 640,883 North Dakota residents (1997). Records indicate that in 1990, 29,732 North Dakota children were impoverished.

Welfare Reform has played a significant role in our outreach to the targeted audience. Many welfare recipients have returned to work but do not earn a living wage. For the month of April 1998, North Dakota had 34,793 people that received food stamps. The participation in the food stamp assistance program represents 5.4 percent of the total population.

##### Performance Goal

- The goal of the North Dakota EFNEP is to provide eligible individuals, with young children, who are responsible for food preparation, and youth with the knowledge, skills and attitudes to form nutritionally-sound diets and to contribute to their personal development. The program is driven by the fact that poorly nourished people perform below their inherent ability at home, at school and on the job. Low-income individuals and youth tend to have poorer than average diets. Inadequate dietary practices can be passed from generation to generation because of a lack of sufficient nutrition knowledge, limited skills to prepare healthful meals and a lack of general resources.
- The goal of the North Dakota FNP is to provide foodstamp eligible individuals, not in the EFNEP program, with the knowledge, skills and attitudes to form nutritionally-sound diets and to contribute to their personal development.

##### Output Indicators

- Food stamp eligible individuals doing food preparation for the family's young children will gain

knowledge in food security.

- Food stamp eligible individuals doing food preparation for the family's young children will gain new knowledge in nutrition.
- Food stamp eligible individuals doing food preparation for the family's young children will gain new knowledge in food buying.
- Food stamp eligible individuals doing food preparation for the family's young children will gain new knowledge in food safety techniques.
- Food stamp eligible individuals doing food preparation for the family's young children will gain new knowledge and skill in food preparation for improved nutrition.

#### Outcome Indicators

- Food stamp eligible individuals doing food preparation for the family's young children will have an adequate supply of food for the entire month.
- Food stamp eligible individuals doing food preparation for the family's young children will increase the amount of fruits and vegetables in their daily diet as evidenced by pre and post food calls.
- Food stamp eligible individuals doing food preparation for the family's young children will show evidence of improved food buying skills by stretching their food resources (money, food stamps, etc.) to last to the end of the month.
- Food stamp eligible individuals doing food preparation for the family's young children will wash their hands before and during food preparation.
- Food stamp eligible individuals doing food preparation for the family's young children will adopt new food preparation techniques to reduce the fat and sugar in their diet.

#### Key Program Components

- Effective internal and external collaboration combined with solid curriculum, staff training and flexible program delivery will continue to be key components of the North Dakota EFNEP and FNP. Effectiveness will be measured through on-going evaluation of skills learned and behaviors modified. In addition to the standard reporting process, a panel of external reviewers -- EFNEP leaders from neighboring states -- have been invited to conduct in-depth reviews of two North Dakota EFNEP sites. The Cass County program was reviewed in December 1997, and the Sioux County program is scheduled for review. Internal reviews of the other five sites are yet to be scheduled.
- The base of foods and nutrition expertise from which the EFNEP and FNP may draw will increase soon with the addition of a new Extension specialist and faculty member at North Dakota State University. Additionally, the food safety/HACCP curriculum has grown substantially making available a variety of program-appropriate materials.
- Exciting, new youth nutrition education materials focusing on diabetes prevention will be developed at North Dakota State University during 1998-00. They will prove highly valuable especially to our Native American clientele whose level of diabetes has reached epidemic proportions. According to the North Dakota Diabetes Association, North Dakota has the highest reported incidence per capita of diabetes in the nation. Native Americans in North Dakota



develop Type 2 diabetes at a rate four to five times greater than the rest of the United States population.

Internal and External Linkages

- The EFNEP and FNP staff will continue to work with county, area and state staff to provide information to adults and youth in the areas of human nutritional needs; food selection , preparation and preservation with emphasis on food safety; food resource management; food production/gardening; and other, program-related areas, as appropriate.
- As identified in an external program review of the Cass County site, the statewide EFNEP will become a more integral part of their respective county program by working more closely with extension agents to expand information and educational opportunities, and program delivery options.
- Linkage with other agencies and organizations is key to the success of the EFNEP and FNP. WIC offices and Food Stamp offices are the primary collaborators in an agency category, with 10 out of 11 WIC offices served and 9 of 10 Food Stamp offices served during FY97. Future collaborative efforts will be given more emphasis and will include, but not be limited to, Social Services, Job service, Commodity Food Program, FDPIR, Community Action Agency, county and state health departments, homeless shelters, YWCA, Indian Health Service, Bureau of Indian Affairs, tribal employment offices, Child Care Food Program, parks and recreation departments, Headstart, community housing centers, libraries, Air Force Base Family Support Programs, public schools, single parents' classes at community centers and tribal colleges.

Target Audiences

- The target audience for the EFNEP include 1) low -income individuals/households (80%) living in either rural or urban areas who are responsible for planning and preparing the family's food (emphasis is on households with young children), and 2) low -income youth (20%) who live in rural or urban areas and who meet the state's definition of 4-H age, which, in North Dakota, is 8 to 18 years.
- The target audience for FNP includes all foodstamp eligible audiences not in the EFNEP program.

Program Duration

5 Years

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever 3d & FNP Funds	2100	2100	2100	2100	2100
	State	0	0	0	0	0
		50	50	50	50	50
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0

0 0 0 0 0

Education and Outreach Programs

This extension program is based on national programs, models and research information.

## **GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT**

### **Program 10: Water Quality–Nutrient Management**

Statement of Issues Over-application of fertilizer can result in degradation of ground and surface water. Use of commercial fertilizer has become an almost universal practice in agriculture. The traditional approach to fertilizer recommendations has been to composite soil samples from a large area to estimate an average fertilizer requirement. The subsequent fertilizer application results in over application in part of the field and under application in the rest of the field.

#### Performance Goals

##### Output Indicators

New site-specific technologies are available that allow precise fertilizer application for specific areas in the field. The methodology and economic evaluation of these technologies need to be evaluated for a variety of agricultural environments. Grid sampling appears to be feasible for high value crops in the relatively flat Red River Valley. Less intense and costly approaches are needed for most of the crops and landscapes outside the Red River Valley. Recent research shows a persistence to nutrient patterns in a field -- even for mobile nutrients like nitrogen. We have also learned that amount of several nutrients is related to landscape position. This knowledge can be the basis of a more economic approach to site-specific fertility applications.

##### Outcome Indicators

- Fertilizer applications that much better match crop needs
- Reduction of excess fertilizer applications

#### Key Program Components

Develop economic site-specific technologies for fertilizer recommendations for a wide range of crops and soils. Demonstration of these technologies on producer fields. Educational program delivered on the technologies, management and results from the use of better fertilizer management.

#### Internal and External Linkages

This program involves the Department of Soil Science and Agricultural and Biosystems Engineering at North Dakota State University and the USDA-ARS at Mandan, North Dakota. Many commercial companies and farm/producers are participants in programming. Financial partners include EPA 319 - Water Quality, Agrium, Potash and Phosphate Institute, Sugarbeet Research and Education Board of Minnesota and North Dakota, Cass County Soil Conservation Districts (SCD), Wild Rice SCD, Stutsman County SCD.

Target Audiences

This program will benefit all producers using fertilizer in crop production. The general public will benefit from the environmental aspects related to water quality.

Program Duration

This program will continue for the five-year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	63	63	63	63	63
	State	87	87	87	87	87
		2	2	2	2	2
1862 Research (\$)	Hatch	42	42	42	42	42
	State	68	68	68	68	68
		1	1	1	1	1

Education and Outreach Programs

An extension program is closely meshed with the research program. The extension specialists involved are carrying a major part of the applied program and are interacting with other researchers and with the industry and producers.

## Goal 4: Greater Harmony Between Agriculture and the Environment

### **Program 11: Water Quality–Animal Waste Management**

#### Statement of Issues

Agricultural pollution primarily from non-irrigated crop land, grazing land, and feedlots presents a significant threat to North Dakota's surface waters. About 60% of the state's total river and stream miles, and about 70% of the lakes and reservoirs are either threatened or impaired for designated uses. In both cases, the major pollutants are nutrients and sediments from agricultural nonpoint sources (U.S. EPA, 1995). Livestock waste has been identified as an increasing source of pollutants. The area occupied by feedlots and other concentrated production units is currently relatively small, however their proximity, relative location in regard to drainage ways, and the concentration of nutrients during snow melt or runoff events, make them a significant factor for pollution of surface and ground water. Alternative livestock (i.e., bison/other) production in feedlot systems may also become viable new enterprises in the Northern Plains region.

#### Performance Goals

##### Output Indicators

- To develop and deliver information which can be used by engineers, extension specialists, producers, and others to design and manage feedlot runoff control.
- To develop and deliver information which can be used by regulatory officials in evaluating livestock waste management systems.

##### Outcome Indicators

- Facilitation of economical designs that will minimize the potential of surface and/or ground water pollution in northern climate settings.
- Reduction of water quality problems because of livestock feedlots.

#### Key Program Components

Research objectives include: 1) determine reliability of on-site testing of manure characteristics, 2) determine the characteristics of bison feedlot manure and runoff, 3) evaluate the performance of runoff control system(s), and 4) develop parameters for the design of feedlot runoff control systems in a northern climate. The extension program will include publications, meetings with producers and regulatory staff and one-on-one consultations with producers.

#### Internal and External Linkages

This research involves the departments of Agricultural and Biosystems Engineering, Civil Engineering and Soil Science at North Dakota State University and the Research/Extension Center near Carrington, North Dakota. External partners include the Natural Resources Conservation Service, North Dakota Health Department, NRCS, Livestock Organizations, and EPA 319- Water Quality.

Target Audiences

Animal waste programming is targeted to operators of feedlot production enterprises, businesses which supply or are otherwise involved with these enterprises, federal, state, and local regulators, as well as the general public.

Program Duration

This program will continue for the five -year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	63	63	63	63	63
	State	87	87	87	87	87
		2	2	2	2	2
1862 Research (\$)	Hatch	42	42	42	42	42
	State	68	68	68	68	68
		1	1	1	1	1

Education and Outreach Programs

An extension program is closely meshed with the research program. The specialist leading the extension education effort works closely with the major researcher of the projects. Both work closely with producers and regulators.

Goal 4: Greater Harmony Between Agriculture and the Environment

**Program 12: Water Quality–Irrigation and Agronomic Management for Crop Production**

Statement of Issues

The irrigated area in North Dakota is increasing in response to the demand for dependable, high yielding, and high quality crops. For example, potato processors are increasingly shifting from non-irrigated to irrigated production. In the MonDak region of western North Dakota and eastern Montana, much of the irrigated acreage is surface irrigated. The potential exists for 500,000 new acres of irrigated crops with sprinkler methods, yet the only high value crop now grown there with irrigation is sugar beets. High value crops, such as potatoes, high quality alfalfa, dry edible beans, carrots, onions, and cabbage, offer more potential return to producers and the increased income would be multiplied throughout the local communities.

Performance Goals

Output Indicators

- Develop improved management practices for irrigated production of high - value crops.
- Promote the protection of ground water through reduced leaching potential.
- Irrigation workshops and meetings held to disseminate educational information.
- Water-Spouts Newsletter sent to over 2/3 of active irrigators in the state.
- Individual assistance to practicing and potential irrigators.

Outcome Indicators

- Increased use of new irrigation technologies and management practices.
- Improved water management and fertilizer use efficiencies.

Key Program Components

Research objectives include: 1) develop fertility practices for appropriately irrigated vegetables (carrots, onions, cabbage, and sweet corn) and potatoes, 2) develop new cultivars of dry edible beans that optimize production under irrigation, and 3) develop evapotranspiration (ET) crop curves for representative cultivars of vegetable crops, dry edible beans, and potatoes. Extension programming will involve the use of workshops and meetings to disseminate information and interact in a group setting with irrigators. The newsletter Water Spouts will be sent to over 2/3 of the state's practicing irrigators six times during the growing season. Selected units will be selected for irrigation pumping plant efficiency testing with the information entered into a data base used for educational programming.

Internal and External Linkages

This program involves the departments of Agricultural and Biosystems Engineering, Plant Science, Soil Science, and the Carrington and Williston Research/Extension Centers of North Dakota State University as well as extension agents in counties with irrigation. External partners include Northharvest Bean Growers, the North Dakota State Water Commission, irrigation dealers and suppliers, and NRCS.

Target Audiences

Demonstrations, field tours, and publications related to this research will educate producers, extension agents, and others regarding improved irrigation technologies. Special emphasis is being given to working with Indian Reservation irrigation development projects.

Program Duration

This program will continue for the five -year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	100	100	100	100	100
	State	140	140	140	140	140
		3	3	3	3	3
1862 Research (\$)	Hatch	62	62	62	62	62
	State	103	103	103	103	103
		1.5	1.5	1.5	1.5	1.5

Education and Outreach Programs

An extension program is closely meshed with the research program. The specialist leading the extension education effort works closely with the major researcher of the projects. Both work closely with producers and the irrigation industry.



## **GOAL 5: ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS**

### **Program 13: Value-Added Agriculture**

#### Statement of Issues

Agriculture remains North Dakota's largest industry, but declining commodity prices and increasing costs are eroding profits for many producers. Adding value to the crops and livestock produced in the state has been recognized for more than a decade as a strategy to reverse the trend of declining profits. However, understanding what consumers want and determining how to profitably produce these products requires continual development and dissemination of new information. Such information has been and will continue to be developed at land-grant institutions, such as North Dakota State University.

Researchers and extension specialists at NDSU have been involved in value-added projects for many years. Projects such as 1) extraction of pectin from harvested sunflower heads for food and industrial uses, 2) recovery of protein from potato processing waste, 3) production of levan (fructose polymer) sugarbeet processing water and 4) development of sensory technology to evaluate the quality of raw and processed products are only a few of NDSU's recent value-added activities. Results of these efforts offer producers and businesses an opportunity to enhance the revenue of the state's agriculture industry.

Generally, value is added through expanded processing (e.g., quick-cooking pasta from durum or frozen dough products from cereal grains), development of additional processed products (e.g., nutraceuticals from oilseeds or extraction of valuable compounds), production of alternative crop and livestock (e.g., bast fiber or bison), or transgenic modification of current agricultural commodities for improving food, non-food and nutritional properties to enhance value. Accordingly, the goal of value-added activities at NDSU is to help businesses and producers increase the level of income generated by North Dakota agriculture and to improve employment opportunities in the state. A challenge will be to assist businesses add value in a way that assures the extra revenue will be realized by the region's producers and businesses.

#### Performance Goals

##### Output Indicators

- The major output of NDSU's value-added projects will be information in various forms. The output may be a novel processing technique, an alternative application of existing processing technology, or the development of transgenic products to improve an existing product.
- Educational materials and training programs to assist businesses and producers interested in adding a value-added component to their business.
- Satisfactory feedback from producers and business persons involved with NDSU programs.

##### Outcome Indicators

- New, successful value-added businesses and increased employment.
- The number of businesses that have adopted an innovative production/processing technology or are using improved management and marketing strategies.
- Value-added technologies and educational materials developed by the researchers and specialists.

#### Key Program Components

Value-added projects at NDSU during the next five years (2000-2004) will follow two themes: 1) basic research to explore the technical feasibility of alternative value-added strategies, and 2) outreach activities to assist firms with commercially feasible ideas based on market assessments. Ideas for both themes will arise from interactions among researchers, specialists, and business people.

Research will focus on the technical feasibility of value-added opportunities. An emphasis will be on basic research which addresses issues such as processing components of ag products grown or indigenous to the region; processing of northern grown crops by extraction of valuable compounds or fractionation into valuable compounds; developing or improving existing technologies or processes; and developing genetically modified ag products to lower processing costs or increase value to consumers.

Another key component will be close and ongoing working relationships with businesses and producers who are interested in pursuing value-added opportunities. These relationships may involve economic feasibility assessments, market analysis, business development, and management and marketing skills training. Internal and external linkages.

#### Internal and External Linkages

Disciplines involved in NDSU value-added activities include Cereal Science, Plant Sciences, Animal and Range Sciences, Food and Nutrition, Agricultural Economics, Agricultural and Biosystems Engineering, Microbiological Science, and the Northern Crops Institute. These researchers and specialists involved in value-added efforts are located at the Experiment Station on the NDSU campus, at Research Extension Centers, and Extension offices. Other NDSU entities that may be involved in value-added efforts include the College of Business, Department of Industrial Engineering, Institute for Business and Industry Development, and Department of Biochemistry.

Likewise, NDSU faculty and specialists will collaborate and include staff at AURI (Minnesota), University of Wisconsin, University of Nebraska, Saskatchewan (POS Pilot Plant), and others. An important component of these efforts will be the interaction among businesses that are interested in adding value to North Dakota agriculture products and the researchers and specialists.

Target Audiences

Target audiences for NDSU's value-added efforts include producers and businesses interested in enhancing the value of North Dakota agricultural commodities. Many of these businesses will be located in the state or region; however, some may be located in other regions of the nation but have an interest in using North Dakota ag commodities.

Program Duration

This program will continue for the five - year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	100	100	100	100	100
	State	140	140	140	140	140
		3	3	3	3	3
1862 Research (\$)	Hatch	104	104	104	104	104
	State	171	171	171	171	171
		2.5	2.5	2.5	2.5	2.5

Education and Outreach Programs

The extension program is closely meshed with the research program. One specialist leading the extension education effort also carries a research appointment and works closely with other researchers in the value-added area. All researchers and extension staff work closely with producers and industry.

## Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

### **Program 14: Rural Economic Development**

#### Statement of Issues

The Great Plains is a vulnerable region in the United States because of its historical dependence on agriculture and its relatively sparse population base. Rural areas have historically been impacted by factors such as the railroad, the Homestead Act, Rural Electrification, the interstate highway system, and numerous changes in farm legislation. In the 21st century, shaping forces will include information technology, agricultural technology, changes in federal policies, and international trade policy. Major changes in the rural landscape are causing great stress as well as creating new opportunities. A growing body of research suggests that the major contributing factors to the continuing decline among rural counties is their inability to adapt to the changes taking place.

Economic development has been a concern for North Dakota policymakers since the economic downturn of the early 1980s. Adverse economic trends in agriculture and the energy sector during the 1980s reverberated through the state's economy. Retail sales, adjusted for inflation, fell almost 20 percent from 1980 to 1988 and still have not regained their 1980 level. Declining sales in many sectors translated into decreased employment, particularly in the state's rural areas. From 1980 to 1992, all but five North Dakota counties experienced decreases in employment.

Local leaders also understand that they must adapt to the many changes taking place and involve citizens as equal partners in decision making and action. They must focus more effort on broadening the base of participation to reflect the cultural and ethnic diversity of their communities. They must embrace multi-jurisdictional, as well as public/private partnerships, to gain efficiencies of size. These leaders want and need technical assistance and training to strengthen their own skills and knowledge so they can be effective in this changing environment.

#### Performance Goals

##### Output Indicators

- Survey's will be conducted to determine factors that are important in influencing location decisions and the economic contribution of firms of different types .
- Additional information will be determined to address questions such as identifying the factors that tend to be associated with rapid employment growth.
- Existing resources in community and economic development will be inventoried and posted, and an assessment of existing community and county plans will be inventoried. The usage of these materials will be noted.
- The North Dakota Input-Output Model will be used to assess the secondary impacts of various types of firms (based on type of product or service, size of firm, and other characteristics).

### Outcome Indicators

- The development and implementation of economic development plans by rural communities.
- The success rates of local decision makers in obtaining funding for economic development efforts.
- The ability of certain rural communities to reverse the existing trend and stabilize or expand their economic and population base.

### Key Program Components

A key program objective is to have all North Dakota communities develop a strategic action plan within five years. All communities will have an active local steering committee to implement the plan. Rural decision makers will have the knowledge, skills, and tools needed to successfully apply for and receive project funding. Community groups will have the tools and expertise needed to implement successful community projects. Extension agents will strengthen their relationship with municipal and county officials. The BUILD community development program will be revised, completed, and used as the base for the program, if possible.

The results of the analysis of the economic effects of migration will offer insights regarding policy development. Analysis of the development of new value-added processing plants in rural areas of the state will result in information to assess the economic, demographic, and public service effects of construction and operation of new processing plants.

Research will examine the socioeconomic effects of plant and mine closures and downsizings on rural communities in North Dakota and Minnesota. Case studies of four or five communities that have been affected by facility closure/downsizing will be undertaken. In addition to analyzing secondary data from federal and state sources, the researchers will conduct interviews with community leaders and a survey of a cross-section of residents in each community.

Another research effort to be undertaken will focus on the socioeconomic impacts of new agricultural processing facilities. Four to six new agricultural processing plants (developed in the 1990s) will be studied. Secondary data for the site counties and communities will be supplemented with information obtained from interviews with company officials and community leaders and from a survey of community residents.

Another effort is to identify and evaluate opportunities for increasing income and employment of North Dakota residents through new or expanded primary sector activities and to develop and maintain selected models and data bases to enable timely analyses of economic trends and impacts.

### Internal and External Linkages

The research to be undertaken at North Dakota State University will complement research being undertaken by other participating states (e.g., Michigan, Washington, Colorado) regarding impacts of migration and changing ethnicity on rural communities. Internal linkages result from collaboration with other departments at NDSU, especially the Department of Sociology, as well as staff from other centers

and institutes on campus. These include the North Dakota State Data Center and the Institute for Business and Industrial Development.

Government agency personnel will work together to create area resource teams. Teams will include participants from USDA Rural Development, local REC's, NDSU Extension Service, and from other interested agencies. USDA and NDSU Extension will provide leadership for the training and development of resources for teams including the development of research -based information for application in decision making.

Target Audiences

Providing timely and accurate information to state and local leaders in North Dakota is particularly important at this time because of the increasing importance of state and local initiatives in economic development, relative to the federal role. Planners and policymakers frequently request information regarding state and local economic trends, the economic base of their areas, and the potential impact of possible changes. Similarly, representatives of various economic sectors often feel a need for information about the contribution of their sectors to the state economy.

Program Duration

This program will continue for the five -year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	112	112	112	112	112
	State	158	158	158	158	158
		4	4	4	4	4
1862 Research (\$)	Hatch	84	84	84	84	84
	State	136	136	136	136	136
		2	2	2	2	2

Education and Outreach Programs

The extension program is closely meshed with the research program. One specialist leading the extension education effort works closely with researchers in the community economic development area.

Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

### **Program 15: Business Retention and Expansion**

#### Statement of Issues

The strategic planning exercises of the state of North Dakota have determined that the state's economy continues to be dependent on agriculture and extraction industries and that diversification is imperative for the state's economic survival. The exercises also show that business retention and expansion is a very important community strategy with 60 to 80 percent of all new employment coming from the current business sector. The retention and expansion of existing businesses also is a strategy in the third phase of the Department of Economic Development and Finance's (ED&F) BUILD community development program.

#### Performance Goals

##### Output Indicators

- Client satisfaction with program and services provided.
- Client use of methods and information.
- Client's willingness to identify further service needs.
- Direct feedback to NIST team members from North Dakota manufacturers.

##### Outcome Indicators

- Community's use of business retention and expansion strategies.
- Job retention/creation within participating communities.
- Increase knowledge of community leaders of concerns of business people and methods to help meet needs.

#### Key Program Components

A BR&E handbook will be updated and made available to the local leadership team and task force. The handbook explains the step-by-step process of the program. Training of the leadership team, task force, and volunteer visitors will be done by extension specialists. Data analysis and report writing will be provided by NDSU Agriculture Economics. ED&F provides a grant for the research costs. Individual counties sponsor the cost of reports. Follow-up programming in the area of customer service and other identified business needs will be conducted upon request. This may be made possible through the cooperation of ED&F, NDSU Extension Service, IBID and Technology Transfer Internal and External Linkages. The NDSU Institute for Business and Industry Development is a technology transfer service to the state's business community with the objectives of being the first point of contact for North Dakota businesses that can benefit from access to the business, scientific and technological resources of NDSU.

Internal and External Linkages

This program is a collaborative effort of NDSU Extension Service, the Department of Agricultural Economics, North Dakota ED&F staff, and NDSU IBID staff. Additional linkages exist with various departments of the North Dakota state government, other units within the NDUS, and the Greater North Dakota Association.

Target Audiences

Target audiences are community and business leaders and governmental agency representatives in the state of North Dakota.

Program Duration

This program will continue for the five - year life of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	112	112	112	112	112
	State	158	158	158	158	158
		4	4	4	4	4
1862 Research (\$)	Hatch	8	8	8	8	8
	State	14	14	14	14	14
		0.2	0.2	0.2	0.2	0.2

Education and Outreach Programs

This is primarily an extension - driven program. Research provides the community survey information.



Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

**Program 16: Asset Building in Youth**

Statement of Issues

Youth need opportunities to be meaningfully involved in family, school, and community in order to develop skills and confidence to become productive, caring adults who contribute positively to society. Experiential learning in areas relating to healthy lifestyles, preparing for careers, developing communication, social skills, leadership and community involvement can provide the education and development of these life skills.

Today's society doesn't always provide examples and opportunities for youth to make healthy life choices; therefore, by providing opportunities to youth and preparing youth workers with resources to build positive assets, 4-H youth programs will build life skills, develop decision-making abilities, foster positive expectations and create meaningful roles for youth in North Dakota. Individual character is essential to the development of a productive individual, responsible leadership, and a caring world community.

Performance Goals

Output Indicators

- Evaluation data and information collected from Character Counts and other character educational programs will indicate participants' reactions to programs.
- Participants in the 4-H Youth Development Program will:
  - participate in county and state events, county and state councils and committees, county Jr. leadership programs, community service learning activities, grant funded youth directed activities.
  - complete assessments to help determine issues affecting North Dakota youth.

Outcome Indicators

- Participants in the 4-H Youth Development programs will:
  - learn how to make appropriate healthy life choices.
  - have an increased ability to resolve conflict.
  - have a better understanding of themselves and other peoples of the world, the earth and its environment.
  - conduct themselves in a manner that respects others, the environment and all living things.
  - be more responsible citizens, leaders and productive members of society.
  - hold themselves accountable for conduct that reflects caring, citizenship, fairness, respect, responsibility, and trustworthiness.

### Key Program Components

Asset building in youth will be the focus of 4-H youth development programs in North Dakota for the next five years (2000-2004). The development of character in youth and their communities will be a major focus of asset building. The Character Counts curriculum will be available for county programming and a statewide initiative. The Character Counts curriculum focuses on six pillars of character: caring, citizenship, fairness, respect, responsibility, and trustworthiness. This program will include training staff (adults and youth) to use the curriculum. Information will be incorporated into literature development, newsletters, and news articles. Additional training will be developed to assist staff and community leaders to consider a strategy for becoming communities of character. 4-H will partner with the North Dakota Department of Public Instruction, through the Division of Independent Study, to work with their Partnership in Character Education Grant. In 1999, this grant will be active in 11 school districts. NDSU Extension Service will play a major role in helping to form community coalitions for character education in these school districts and other communities as they join the character education movement. Ethics education will be incorporated into programs when appropriate, i.e., state fair participation, leader training, etc.

Nutrition/Health Curriculums will be introduced and incorporated into the ongoing project and school programs. The "Health, It's Your Choice" curriculum (five levels) developed through the 4-H Cooperative Curriculum System (4-HCCS) will be introduced and implemented throughout the state. An "Issues Investigation" curriculum developed through 4-HCCS will be introduced and implemented in counties as requested.

International/Intercultural programs are integral in supporting opportunities for youth and adults, to gain an understanding of the diversity in our state and world. Cultural youth exchange programs will be encouraged. Program participants will be sought. Program components will be dispersed throughout the youth development program. A leadership education curriculum will be introduced and implemented in North Dakota counties.

Youth Adult partnerships will be encouraged and efforts will be made to include youth on boards and in decision-making groups.

### Internal and External Linkages

NDSU Extension Service volunteer and paid staff at state and county levels will be involved in asset building for youth. The staff will cooperate with the staff in the Child Development and Family Science Department and school of education at NDSU. Other partners include the NDSU Department of Independent Study, the North Dakota Department of Public Instruction, and the North Dakota Department of Health. Schools and public partners will be part of programs at local levels. The 4-H Cooperative Curriculum System (36 states) and the Josephson Institute of Character Development will provide most of the curricula used.

Target Audiences

Target audiences for asset building in youth include youth participating in 4-H youth development programs, their parents and families, volunteer and paid staff working with the 4-H program and the communities in which participants live.

Program Duration

This plan will continue for the five years of the plan.

<u>Allocated Resources</u> (\$ x 1,000)		FY				
		00	01	02	03	04
1862 Extension (\$)	Smith-Lever	181	181	181	181	181
	State	254	254	254	254	254
		6.5	6.5	6.5	6.5	6.5
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0
		0	0	0	0	0

Educational and Outreach Programs

4-H youth development programming efforts are underway in all North Dakota counties. Efforts will focus on programs where volunteer and paid staff have been trained in using support materials and partnering with community groups.

Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

**Program 17: Career Readiness - Preparing North Dakota Youth**

Statement of Issues

Youth in North Dakota need opportunities to explore career possibilities, to view education as a tool to success, and learn the attitudes, skills, and work habits valued by employers and needed by entrepreneurs. Youth need to know what to expect in the workplace.

Science and technology affect the career opportunities for youth. Science and technology education will affect decisions relating to future education and careers. The 4-H program can supplement and enhance science and technology education now offered in schools for youth and adults.

Performance Goals

Output Indicators

- The number of children, adults, and families participating in programs and events will be recorded.
- Career awareness will be measured on the basis of numbers and variety of career options accessed by program participants.

Outcome Indicators

- Youth will explore potential career options.
- Youth will learn to research career choices, to consider the requirements of various careers and to make good decisions based on their research.
- Youth will develop the attitudes, skills and work habits needed in the workplace.
- Youth will develop greater awareness of science and technology, and their relationship to education and careers.
- Youth will develop critical thinking skills and grasp scientific concepts and processes.

Key Program Components

I. Career Awareness

- A. Appropriate partners will be identified and recruited in communities, counties, and the state to provide on-site opportunities for career exploration. Career skills will be linked to 4-H education. On-line and in-person mentoring relationships will be provided between youth and professionals. Youth entrepreneurship projects and programs will be continued, supported and expanded. Opportunities will be sought for youth to travel to expand their experience with career options. A three-year development track will be encouraged and developed at the North Dakota Extension Youth Conference: Year 1 - Career Exploration, Year 2 - Career Preparation and Year 3 - Marketing Oneself and Job Search Techniques.

II. Preparing to Work

A. A curriculum on resumes, interviews and job search techniques will be provided. Service learning concepts will be expanded statewide through partnerships with the Department of Public Instruction and individual school districts. A "Service Learning" project for groups or individuals will be developed and expanded. The "WOW" (Wonders of Work) curriculum for use by elementary school aged youth and the "It's A Big World" curriculum designed for parents and caring adults to help youth prepare for a career will be implemented in communities across North Dakota.

III. Science and Technology

A. A North Dakota Technology Corps of 4-H teens, volunteers and staff will be developed. Hands-on science opportunities will be provided for North Dakota youth. County science offerings at fairs, achievement days and activity days will be supported. Youth will be trained to provide hands-on science experiences for grade school children. Experiential learning curriculums developed through the 4-H Cooperative Curriculum System (36 states) will be introduced and implemented. These curriculums include "Woodworking Wonders" (four levels), "Horticulture (plant science) (three levels), "Insectaganza of Excitement" (entomology) (three levels), "Electric Excitement" (four levels), "Soaring Above and Beyond Aerospace" Adventures (four levels) statewide. Many farm and family economics programming plans will include youth programs. Youth agricultural programs: "Agriculture in the Classroom, Careers in Agriculture Day, Experience Agriculture" Computer curriculum will be supported.

Internal and External Linkages

Statewide linkages in the career readiness program will include the North Dakota Department of Public Instruction, local schools including guidance counselors and teachers assigned to help youth prepare for careers, volunteer and paid staff working with 4-H youth development programs and local business communities. The curriculums used for many 4-H activities will be provided through work with the 4-H Cooperative Curriculum System (36 states). Program implementation plans used by 4-H programs in other states Cooperative Extension Services will be shared and adapted for use in North Dakota. The "It's a Big World" curriculum was developed through a grant from Cargill. The National 4-H Council will also help to provide program assistance.

Target Audiences

Target Audiences for Career Readiness - Preparing North Dakota Youth include youth and their families in North Dakota communities, volunteer and paid staff working with the 4-H program, schools and community organizations and citizens who form partnership or support career readiness programs.

Program Duration

This plan will continue for the five years of the plan.

Allocated Resources  
(\$ x 1,000)

FY				
00	01	02	03	04

1862 Extension (\$)	Smith-Lever	181	181	181	181	181
	State	254	254	254	254	254
		6.5	6.5	6.5	6.5	6.5
1862 Research (\$)	Hatch	0	0	0	0	0
	State	0	0	0	0	0
		0	0	0	0	0

Educational and Outreach Programs:

4-H Youth development programming efforts are underway in all North Dakota counties. Some volunteer and paid staff have been trained in use of some of the curriculums. Efforts will be made to focus on programs with staff trained in programs related to career readiness. The preliminary steps for forming a youth technology corps have been taken.

## **STAKEHOLDER INPUT PROCESS**

### State Board For Agriculture Research and Education (SBARE)

SBARE was created by the North Dakota State Legislature in 1997 to provide management and have budget authority for the North Dakota Agricultural Experiment Station (NDAES) and oversight to the NDSU Extension Service (NDSUES). In 1999, management and budget authority for the NDSUES was added to the responsibilities of SBARE. The membership of SBARE is composed of 15 persons from around the state. Five of the members are appointed by the Agricultural Coalition, five members are appointed from the NDSUES' multicounty programming unit advisory committees, the President of NDSU, Vice President, Dean and Director for Agricultural Affairs at NDSU, Director of the NDSUES, Director of the NDAES and the North Dakota Commission of Agriculture. This board, composed primarily of citizens from around the state, gives direction to all research and extension programs.

### Multicounty Program Unit Advisory Committees

For extension programming purposes, the state's 53 counties are divided into 10 Multicounty Program Units (MPUs). These MPUs meet on a regular basis and plan and coordinate extension programming within the units. Each of the MPUs have an advisory board composed of 12 citizen members. The members for the board are selected by existing board members and county extension staff to represent the various constituencies which exist in the area and to maintain a gender balance. The advisory boards give direct input relating to needs for extension programs within their units and review existing programs.

### Research Extension Center Advisory Committees

Each of the seven Research Extension Centers (REC's) have a citizen advisory board, composed primarily of agricultural producers, which gives oversight and direction to the research activities at the centers. The input from these advisory boards is utilized directly by each center, and is also utilized by all centers and the main station research staff when the staff from all seven centers meet with main station staff twice each year.

### Assessment of the NDSU Extension Service

In 1996, an external and internal assessment of the NDSU Extension Service was completed by a commercial marketing firm. The study was commissioned by extension to determine the awareness of citizens of the NDSUES, to determine what they thought of extension programming, to determine people's needs and desires for programming and how they wanted programming to be delivered. The responses were segmented for the general public, businesses and agricultural producers so responses from these groups could be separated. The results from this survey are still used by extension program planning teams as they plan and prioritize their programming.

## **UNDER-SERVED AND UNDER-REPRESENTED AUDIENCES**

A major under-served and under-represented audience in North Dakota is Native Americans, and increased emphasis is being given to work more closely with this group, especially those living on the four Indian Reservations. Two reservations are staffed with full-time agricultural agents and full-time youth agents. The other two reservations are served by the extension agents in the county in which the reservation lies. Both of these extension offices have specific programs directed towards Native American audiences. Extension programs include expanded educational efforts with Native American farmers both in crop and livestock production, as well as targeted youth programming and family and nutrition programming. For example, at least two reservations are involved with raising Buffalo, and NDSU livestock specialists are working with those producers. An NDSU irrigation specialist is working with four of the Native American 1994 Land Grant Colleges on programs involved with utilization of native plants, plant diversity and gardens for self sufficiency. The NDSU Extension Service participates in a yearly meeting with the reservations to discuss how USDA services can better serve the Native American audiences living on the reservations. Many nutrition programs focus on both Native American and low income families. These programs provide education on selecting and preparing nutritious meals on a limited budget. Diabetes is a major problem with Native Americans. A major program focuses on the reduction of the incidence of diabetes through diet and exercise and the reduction of the debilitating effects of the disease by proper diagnosis and treatment. This program has been designed in cooperation with the reservation tribal councils, Indian Health Service, the State Department of Public Health, the Center for Disease Control, Head Start, the American Diabetes Association, the Tribal Colleges, NDSU Food and Nutrition Department, and the reservation elementary schools.

A major youth program on one reservation focuses on community gardening to improve food resources, increase knowledge about food choices, and promote health eating by including more fruits and vegetables in the diet. This program is supported by resources from other community agencies, including resources from the Three Affiliated Tribes at Ft. Berthold, and the National Gardening Association. There was volunteer support from 12 people. Over 100 different community members, including stakeholders and decision makers, were invited to the garden and enjoyed a meal from its produce and guided tours from the gardeners.

## **MERIT AND PEER REVIEW**

### Merit Review

Extension Program Leaders from North Dakota, South Dakota, Nebraska and Kansas meet on a regular basis to develop joint program opportunities for these four states. Programs impacting all four states have been developed as a result of these regular planning meetings. To increase the effectiveness of programs in these states, the program leaders exchange plans of work in agriculture and natural resources, family and consumer science, youth and community resource development. Program leaders review the plans of work for the other states for both content, methodology and projected outcomes.

### Scientific Peer Review

Research programs are subject 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 multi-state research projects receive a critical review of their contributing project from fellow committee members, the administrative adviser, and the NC Multi-State Research Committee. Second, most faculty augment multi-state 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 NDAES 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 viewed, either internally or externally, prior to publication.

## **MULTI-STATE RESEARCH & EXTENSION ACTIVITIES**

### Hatch Multi-state Research

Research faculty partner extensively with other land grant institutions, federal and state research centers, and private sector firms. NDSU participates in 14 Hatch multi-state research projects. Appendix B lists the Hatch multi-state projects and the committees which the NDAES is active in, together with the contact person at NDSU. In addition, faculty collaborate with peers at other land grants through competitive grants, like the U.S. Wheat and Barley Scab Initiative. We also have extremely close ties with USDA-ARS researchers in Fargo, Mandan, and Sydney, Montana - including joint appointments and adjunct faculty. Specific external linkages are noted in the descriptions of each program area.

### Smith-Lever Multi-state Extension

NDSU Extension Service agents, specialists and administrators are very involved with other land-grant universities on programs with multi-state impact. North Dakota and Minnesota have formal agreements for the support of two joint Extension Sugarbeet Specialists and one technician, one Extension Potato Specialist, and one Extension Cropping Systems Specialist. The Two Sugarbeet Specialists and technician and the Cropping Systems Specialist are faculty members of North Dakota State University and the Potato Specialist is a faculty member of the University of Minnesota. Costs for support of the specialists and technician are split equally between the two states. North Dakota and Minnesota also have a Memorandum of Understanding for an Extension Livestock Economist from NDSU to work on beef economics with Minnesota producers and an Extension Economist from U of M to work with swine economics with North Dakota producers.

NDSU Extension Specialists and agents are involved with Minnesota, South Dakota and Montana agents and specialists in a multitude of programming efforts. These include educational programming such as the Tri-state Corn Symposium, Norharvest Bean Day, Northwest Farm Managers Association, Soybean Expo, Regional Risk Management Training, Minnesota-North Dakota Cooperative Executive Training Program, North and South Dakota and Montana Range Management Workshops, Minnesota Fruit and Vegetable Growers, MinDak Agribuilders, Advanced Crop Advisors Workshop, Red River Valley Vegetable Task Force, Northern Plains Sustainable Agriculture Society and Big Iron Educational programming.

Specialists and agents are also involved with regional and national projects with multi-state impacts. Examples include the MidWest Plan Service, Beef Cattle Handbook, Livestock Marketing Information Center, EWEASK regional sheep CDROM development, National Beef Database, and North Central Center for Rural Development.

Extension program leaders from Kansas, North Dakota, South Dakota and Nebraska have been collaborating on programming activities for about four years. The leaders have developed and offered three in-service opportunities for specialists and agents from the four states. These in-service opportunities have focused on program impact assessment, responding to change in agriculture and program planning. Collaboration by faculty among the four states has been encouraged and supported by Extension Administrators in the four states.

Specialists and agents are also involved with considerable informal multi-state cooperation in working with out-state extension staff and producers. This is considerable in the Red River Valley which encompasses Eastern North Dakota and North Western Minnesota. The soils, crops and management practices are similar across the valley and consequently agents and specialists work quite freely across the state lines. A similar situation exists in the Williston area, in North Western North Dakota, and Sydney area in North Eastern Montana. Here the similarity includes dry land cropping, range cattle operations and irrigation in the Yellowstone River Valley. Again agents and specialists from the two states work cooperatively across the state line. To help foster cooperation, the Montana State University Experiment Station at Sydney and the Williston Research Extension Center in North Dakota share a Director.

To help document the amount of time NDSU Extension specialists, agents and administrators spend on multi-state extension programming, they were asked to voluntarily report that time in days spent per year during the past year. They were also asked to identify the major project areas where the multi-state programming occurred. The majority of staff responding were Agriculture and Natural Resources specialists and agents and administrators. The actual time spent is higher, as numerous staff did not respond. Appendix A lists the multi-state activities by name and with dues and memberships paid which support multi-state programming and collaboration. At the present this exceeds the 25% requirement of federal funds.

## **INTEGRATED RESEARCH AND EXTENSION ACTIVITIES**

Extension and research efforts are integrated closely at North Dakota State University. Extension specialists and researchers within departments report to a single department chair, and area extension specialists, housed at research extension centers, report to the center director. Researchers at the centers also report to that same director. Many state and area extension specialists also carry a research appointment and those that don't carry a research appointment are involved with applied research projects. Likewise, researchers both at the campus and center level carry out both research and outreach activities with producers. Research and extension are integrated at the administrative level by the position of Vice President for Agricultural Affairs, Dean of the College of Agriculture, and Director of the Experiment Station, which is held by one person. The Director of the NDSU Extension Service reports to that person. The Agricultural Communication unit and the fiscal office for research and extension are also fully integrated units and support both functions. As a minimum, 25 percent of Smith-Lever and Hatch funds are utilized in integrated activities.

### **CONTACT**

The contact person for this Plan of Work is:

Darnell Lundstrom, Assistant Director  
NDSU Extension Service  
North Dakota State University  
P.O. Box 5437  
Fargo, ND 58105

telephone: 701-231-7173  
FAX: 701-231-8378  
email: agnrdir@ndsuent.nodak.edu

### **SUBMISSION**

This Plan of Work is submitted to meet the requirements of the Agricultural Research, Extension, and Educational Reform Act of 1998 (AREERA) and the CSREES - USDA "Guidelines for Land Grant Institution Plan of Work."

(signed)

Patricia Jensen, Vice President, Dean & Director for Agricultural Affairs  
Director, North Dakota Agricultural Experiment Station

(signed)

Sharon Anderson, Director  
NDSU Extension Service