North Dakota Agricultural Experiment Station

NDSU Extension Service

NORTH DAKOTA STATE UNIVERSITY

2015-2017 Biennial Budget Request

House Bill 1020

House Education and Environment Division

Representative David Monson, Chair

Jan. 14, 2015

NDSU Extension Service - Budget No. 630

North Dakota Agricultural Experiment Station
- Main Station - Budget No. 640
- Branch Research Extension Centers - Budget No. 628
- Agronomy Seed Farm - Budget No. 649

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NDSU NORTH DAKOTA STATE UNIVERSITY

Agency Overview

NDSU Extension Service

Agency Statutory Authority

North Dakota Century Code Chapter 4-08.

Agency Description

The North Dakota State University (NDSU) Extension Service is part of a nationwide, university-based educational system that provides research-based educational programs to citizens in all 53 counties and four American Indian reservations in North Dakota. Programs focus on selected needs and issues affecting the state's agriculture, youth, families, communities and natural resources. The staff is located at state, area and local/county offices. The NDSU Extension Service combines funding from federal, state, county and grant sources to specifically address local concerns.

Agency Mission Statement

The purpose of the NDSU Extension Service is "to create learning partnerships that help youth and adults enhance their lives and communities." This purpose is accomplished through the dissemination of research-based information and the implementation of educational programs geared to the changing needs of North Dakotans. Major program areas include agriculture and natural resources; youth development; family and consumer sciences; and community economic development and leadership.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19, the State Board of Agricultural Research and Education (SBARE) presents a status report to the budget section of the Legislative Council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the Legislative Council office.

Agency Future Critical Issues

Areas that need continued emphasis and emerging issue areas that need to be addressed include livestock industry support to optimize management practices, implementation of precision agriculture, enhanced technological capacity for Extension delivery of information, and technical support to increase the efficiency of agricultural specialists; educational programs on informed decision-making and community-based leadership for communities impacted by either oil development or population loss; increased education to address chronic disease prevention, consumer education on food systems, and food safety; increased educational capacity to address ND water quality issues; youth development through expanded 4-H efforts in leadership education and agri-science and technology; recruitment and retention of Extension employees in the high-cost oil-producing counties; and increased operating.

NDSU EXTENSION SERVICE

NDSU Extension Service

Update of Extension Initiatives Funded in 2011-13 Budget

- **Costs to continue FY2011 salary increases**
  $508,356 received and allocated July 1, 2011

- **Infrastructure: technical support**
  $450,000 3.0 FTE, Research Specialists hired

- **Soil health and land management**
  $690,000 received
  - $210,000 salary and fringe benefits, 1.0 FTE State Extension Specialist hired in soil health
  - $360,000 salary and fringe benefits, 2.0 FTE Area Extension Specialists hired at Langdon REC and North Central REC
  - $120,000 operating; distributed

- **Livestock specialist – Livestock Stewardship**
  $250,000 received
  - $210,000 salary and fringe benefits, 1.0 FTE State Extension Specialist hired in livestock stewardship
  - $40,000 operating; distributed

- **State Soil Conservation Committee**
  $150,000 received and added to previous funding
  Additional funding distributed as grants to Soil Conservation Districts to help landowners reduce soil erosion, improve water quality, and enhance tree plantings, grazing lands and wildlife habitat.

NDSU Extension Service

Update of Extension Initiatives Funded in 2013-15 Budget

- **Costs to continue FY2013 salary increases**
  $540,528 received and allocated July 1, 2013

- **Agents-in-training and summer internship program**
  $250,000 received (no fte), Salary pools for two 12- to 18-month agent-in-training positions and three 8-to 12-week summer student internships, hired

- **Livestock development**
  $370,000 received
  - $220,000 salary and fringe benefits and operating, 1.0 FTE Area Livestock Specialist hired in Extension livestock programs at CGREC
  - $150,000 operating support, livestock production economics; allocated and program initiated

- **Crop and resource protection**
  $150,000 received, salary and fringe benefits, 1.0 FTE technical support hired for the weed science or potato programs

- **Rural Leadership North Dakota program**
  $125,000 received and allocated

- **Junior master gardener program**
  $25,000 received, 2 interns Burleigh county extension; funds allocated

- **State Soil Conservation Committee**
  $150,000 received and added to previous funding
  Additional funding received to fund grants to Soil Conservation Districts as well as help landowners reduce soil erosion/ improve water quality; and enhance tree plantings, grazing lands and wildlife habitat.

- **Video conference equipment**
  $110,000 received, funding allocated

- **North Dakota 4-H Camp**
  $950,000 general funds, $1,650,000[1] other funds; construction in progress
  (Facility details available on page 9)

Additional Item

NDSU Extension Service received $10,500 from the general fund pool appropriated to the Office of Management and Budget (OMB) for needs resulting from energy development. This amount was paid to employees in oil impacted communities.

[1]March 12, 2014, Budget Section authorized $700,000 additional Other Funds spending for the North Dakota 4-H camp project increasing total Other Funds from $950,000 to $1,650,000.

NDSU Extension Service

2013-15 Legislation that Included Reporting Requirements to 2015 Appropriation Committees

SB2020 (NDSU Research & Extension, & Agronomy Seed Farm)

SECTION 2. ONE-TIME FUNDING - EFFECT ON BASE BUDGET - REPORT TO SIXTY-FOURTH LEGISLATIVE ASSEMBLY. The following amounts reflect the one-time funding items approved by the sixty-second legislative assembly for … the 2013-15 one-time funding items included in the appropriation in section 1 of this Act:

One-Time Funding Description
Extension 4-H camp renovation - $2,600,000 ($950,000 GF, $1,650,000 OF*)
Extension video conference equipment - $110,000
Extension master gardener internships - $25,000
Total other funds – $1,650,000
Total general fund - $1,085,000

The 2013-15 one-time funding amounts are not a part of the entity's base budget for the 2015-17 biennium. The main research center shall report to the appropriations committees of the sixty-fourth legislative assembly on the use of this one-time funding for the biennium beginning July 1, 2013, and ending June 30, 2015.

- **Extension 4-H camp renovation** – $2,600,000 ($950,000 GF, $1,650,000 OF*)
  Status: Current buildings are being modernized and a multipurpose education center is under construction. Project scheduled to be completed spring 2015.
  (See facilities page 9)

- **Extension video conference equipment** – $110,000
  Status: Video conference equipment replacement at 14 location; 13 complete, 1 in process

- **Extension junior master gardener internships** - $25,000
  Status: 2.0 Interns hired in Burleigh County Extension

*March 12, 2014, Budget Section authorized $700,000 additional Other Funds spending for the North Dakota 4-H camp project increasing total Other Funds from $950,000 to $1,650,000.

NDSU Extension Service

North Dakota 4-H Camp Renovation and Building Project

FACILITIES

2013-2015 Authorized Amount:
$2,600,000 ($950,000 general funds, $1,650,000 other funds)

- May 2013 – Legislature authorized funding as requested $1,900,000 ($950,000 General Funds, $950,000 Other Funds) in SB 2020.
- June 2013 - SBHE authorized NDSU to proceed with the renovation and expansion of the North Dakota 4-H Camp facilities in an amount up to $1,900,000.
- Jan 30, 2014 - SBHE authorized $700,000 additional Other Funds spending, increasing total Other Funds from $950,000 to $1,650,000 and seek Budget Section approval.
- March 12, 2014 – Budget Section authorized $700,000 additional Other Funds spending, increasing total Other Funds from $950,000 to $1,650,000.
- Groundbreaking - August 2014
- Estimated completion date - Spring 2015

NDSU EXTENSION SERVICE

2015-17 Program Initiatives as Ranked by SBARE

1 Agricultural Programs and Capacity

Situation: For agriculture to maintain its cutting edge, increased Extension capacity is needed in livestock, precision agriculture and support infrastructure. The livestock industry of southwest North Dakota lacks educational support on forage resources for backgrounding and other management practices. In precision agriculture, producers need assistance with management of large quantities of data and integration with financial decisions. To meet increased demands of delivering information in a variety of media, Extension needs increased technological capacity. Specialists need increased technical support to efficiently program in the departments of Animal Science, Soil Science, Plant Pathology and Plant Sciences.

Need: Area livestock specialist-HREC (1.0 FTE) and operating; Extension precision agriculture economist (1.0 FTE) and operating; increased operating support for Extension's technology infrastructure; Extension fellows (3.75 FTE) for increased support of specialists - $1,285,000

2 Community Vitality

Situation: The social, environmental and economic well-being of many North Dakota communities is in danger if communities do not take steps to shape their own future. The unprecedented growth is driving the demand for Extension assistance in community development. Community-based issues can be addressed more effectively through community-based leadership, public dialogue, planning processes, organized public forums and informed decision making. Specialists can develop programs and utilize agents to bring educational programming to local communities. North Dakota's farm and ranch owners also have a critical need to begin transition/succession planning. One of the three requested specialists will focus on transition and succession planning programs.

Need: Area community vitality specialists (3.0 FTE) and operating - $780,000

3 Food Systems and Health

Situation: North Dakota needs healthy people and communities, including farm/ranch families. Educational programs can enhance health by targeting chronic disease prevention, food systems consumer education and food safety, including education on the Food Safety Modernization Act. Extension is uniquely positioned to address each of these needs with factual information and to leverage its strong partnerships with health organizations and specific community-based task forces to meet local needs. Area specialists (east and west) will provide leadership to address these needs. A salary pool will increase our capacity for county agents to provide local programming.

Need: Area food and health specialists (2.0 FTE) and operating funds, and a salary pool to increase local county programming - $720,000

4 Water Resources

Situation: Water is extremely important for the life of all North Dakotans, such as water quality for livestock, drinking water quality in homes, impacts of saltwater spills, and best management practices to prevent nutrient movement to surface water. A water specialist is needed to provide educational programs and information to assist land owners and citizens to make informed decisions when using and protecting our precious water resources.

Need: Extension water specialist (1.0 FTE) and operating funds - $310,000

Details on other unranked Extension needs are available upon request.

DETAILS:
2015-2017 Program Initiatives as Ranked by SBARE

NDSU Extension Service

1. Agricultural Programs and Capacity

$1,285,000 Total General Fund Increase

1.0 FTE Area livestock Extension specialist – HREC **$200,000**
Operating **$80,000**

Southwest North Dakota is experiencing a major reduction in land enrolled in the Conservation Reserve Program (CRP). Frequently these lands were used as emergency hay lands for livestock producers during drought and now those emergency hay supplies are no longer available. The calf backgrounding industry expanded rapidly in the early 2000s based on the availability of forage, but that has changed. An area livestock specialist is needed to assist the industry with education on untapped forage resources for calf backgrounding and other livestock production issues in the southwest. This position will also provide the first and only Extension area specialist position at the Hettinger REC.

1.0 FTE Extension precision agriculture economist **$230,000**
Operating **$80,000**

Precision agriculture describes a multitude of technologies that crop and livestock producers can employ to improve their productivity through site-specific farming or managing livestock at a sub-herd or individual level. These technologies include variable rate planting and fertilizer applications, site specific hybrid and variety planting, and remote pest and crop monitoring. For farmers and ranchers to profitability use these technologies, they need to understand the costs and benefits of the technology and be able to effectively manage the amount and types of data in making management decisions. An Extension precision agricultural economist will develop and provide information, educational programs and decision support tools to address these needs.

Extension infrastructure operating support **$320,000**

Reliable, accurate, research-based information is the basis for sound crop and livestock production and resource protection decisions. This has been the hallmark of the NDSU Extension Service. Technology can enhance how people manage and receive the information that they need to be successful and profitable. New information-sharing technologies like apps, YouTube videos, embedded computer programs and social media have greatly expanded the opportunities and needs for Extension to use these techniques to supplement our delivery of programs and information. However, we lack the internal capacity to enable our specialists and agents to fully harness these technologies. These technologies will not replace the need for Extension agents and specialists to interact directly with people, but this added capacity will improve the quality and quantity of advanced technology used to meet consumer expectations.

3.75 FTE Extension fellows **$375,000**

The responsibilities of NDSU Extension specialists are highly demanding because they often cover numerous crops or multiple program areas. In addition, they frequently need to conduct applied research and field demonstrations to generate and disseminate the information needed by their North Dakota clientele. To effectively and efficiently use the specialized talents of these specialists, they have a need for technical support for their applied research and in developing materials for their educational programs. Furthermore, NDSU Extension recognizes the need

to train the next generation of Extension state and area specialists and agents with individuals who are experienced in Extension. To fulfill these three needs, Extension fellows are requested to support specialists in the departments of Animal Science (0.75 FTE), Soil Science (1.5 FTE), Plant Pathology (0.75 FTE) and Plant Sciences (0.75 FTE). The fellowships will be 0.75 time positions with the expectation that they work on their graduate degree while providing technical support to their specialist's Extension program. At the completion of their degree in three to six years, their position will terminate and the fellowship will be used to recruit a new fellow.

2. Community Vitality

$780,000 Total General Fund Increase

3.0 FTE Area community vitality specialists	**$600,000**
Operating	**$180,000**

The social, environmental and economic well-being of many North Dakota communities is in danger if communities do not take steps to shape their own future. Energy growth in the west poses multiple farm, ranch, business and community challenges due to rapid growth while many other small towns are suffering from record population and service losses. Unprecedented growth in North Dakota is driving the demand for Extension assistance in community development along with population forecasts, impact studies and resource impacts. Community-based issues can be addressed more effectively through community-based leadership, public dialogue, planning processes, organized public forums and informed decision making. Specialists will develop programs and utilize agents to bring educational programming to local communities.

One of the most significant community concerns is the rapidly changing landscape of farm owners and operators. Less than 50% of farm and ranch families have a will, much less a transition plan. Without proper planning, they will not pass the land to the next generation. This threatens the fabric of many small communities in North Dakota. North Dakota's farm and ranch owners have a critical need to begin transition/succession planning. One of the three requested specialists will focus on transition and succession planning programs for the state, and lead Extension's efforts to assist families with developing their strategic plan and being prepared to work with professional advisors to complete their plans.

3. Food Systems and Health

$720,000 Total General Fund Increase

2.0 FTE Area food and health specialists	**$400,000**
Operating	**$120,000**
Salary pool to increase local county programming	**$200,000**

North Dakota needs healthy people, communities and agri-business, including farm/ranch families. More specifically, three key aspects emerge as needs for North Dakotans: nutrition and wellness, food-systems consumer education, and food safety. Chronic disease prevention education will be successful when based on solid nutrition and wellness education. NDSU Extension Service is uniquely positioned to foster access to healthy physical activity and nutrition environments, offer chronic disease prevention education throughout the state, and to leverage its strong partnerships with health organizations and specific community-based task forces that form to meet identified local needs.

Consumers, even in North Dakota, are often disconnected from the source of their food and are confused by misinformation about GMOs, organic foods and other food claims. Existing Extension programs are factual and successful but very limited in reach. Increased capacity of Extension educators is needed to address the disconnection between consumers and the agriculture industry.

Despite the rising numbers of foodborne illnesses in ND, NDSU Extension has no funded position in food safety to respond to the growing demand for education. Nationally there is a strong emphasis in this area and evidence of how one outbreak can destroy a food business. The Food Safety Modernization Act will significantly increase the pressure for education, and North Dakota producers and consumers will require more support.

4. Water Resources

$310,000 Total General Fund Increase

1.0 FTE Extension water specialist	**$230,000**
Operating	**$80,000**

Water has been and will continue to be an extremely important aspect for the life of all North Dakotans. However, many questions are being asked on topics such as water quality for livestock, drinking water quality in homes, impacts of saltwater spills, best management practices to prevent nutrient movement to surface water, and how water can be used efficiently in new local foods ventures. Educational programs and information are needed to assist land owners and citizens to make informed decisions when using and protecting our precious water resources. The resulting water quality educational program will work in cooperation with conservation groups and state regulatory agencies.

NDSU Extension Service

2013-2015 IMPACTS

Through its research-based educational programs, the NDSU Extension Service strives to:

- Enhance the profitability of North Dakota's crop and livestock producers by focusing on production, marketing and risk management issues
- Conserve and enhance the natural resources of our state
- Develop life skills within North Dakota's youth through 4-H youth development programs that focus on decision making, communication skills, career development and healthy lifestyles
- Strengthen individual and family skills relating to parenting, school readiness, financial management, work force preparation and communication
- Maintain a healthy food system at the production, distribution and consumer levels while promoting healthy lifestyles for all age groups
- Provide leadership for communities and community leaders to identify strengths, enhance local expertise and increase the rural economic base while creating an environment that fosters entrepreneurship
- Guide communities through processes that relate to public issues
- Serve as educational leaders in the adoption and utilization of technology for economic, community and individual benefits

Extension agents and specialists had more than 817,000 direct educational contacts with North Dakota residents in 2013 in the below areas. We anticipate similar levels of educational contacts in 2014 when the reporting year is complete.

- Community Vitality
- Crop Management
- Family Economics
- Farm Business Management
- 4-H Youth Development
- Horticulture and Forestry
- Human Development and Family Science
- Livestock Management
- Natural Resource Management
- Nutrition, Food Safety and Health

COMMUNITY VITALITY

Helping North Dakota Manufacturers Compete in the Global Market

In 2013, NDSU Extension's program in manufacturing collaborated on over 35 public/private projects, assisted 172 manufacturers/inventors/entrepreneurs, leveraged over $150,000 in research grants, saved manufacturers over $150,000, and trained over 200 industry professionals. U.S. manufacturing has lost many low-tolerance, high-volume jobs to lower cost countries. More recently, however, competition for resources, such as labor in the oil and gas industry, is also squeezing manufacturers' margins. To compensate, manufacturers must adapt by innovating products and processes to lower costs. The manufacturing program in Extension, including the Institute for Business and Industry, offers high quality, unbiased business and technical information and consulting, plus access to NDSU resources, i.e. College of Engineering and College of Business, and North Dakota's manufacturing resource network. NDSU support includes product and process innovation through projects such as Senior Design, Tech Park research and development, quality assurance, inventory control, plant layout, human resources, product design, prototyping (including 3D printing), identifying North Dakota factories to build product, process improvement, assistance in developing business and marketing plans, patent information, grant-writing assistance, business startups, domestic and global outsourcing, and safety and environmental issues.

Cultural and Heritage Tourism Activity Grows in ND with Extension

Local citizens, the NDSU Extension Service, the North Dakota Department of Commerce Tourism Division, State Historical Society of North Dakota, Center for Heritage Renewal at NDSU, Germans from Russia Heritage Collection at the NDSU Library, and other groups and agencies have created an alliance that focuses on preserving and promoting the rich cultural heritage of the Germans from Russia in Emmons, Logan and McIntosh counties. These three counties, sometimes referred to as part of the "Sauerkraut Triangle," are at the heart of German-Russian immigrant settlements.

One of the goals of this group is to increase tourism opportunities in the tri-county area. Thus far, the alliance has inventoried the cultural and heritage resources found in the area, and conducted interviews of the oldest living generation of Germans from Russia in the area producing, *Ewiger-Sastz – Everlasting Yeast*, a book that brings together recipes, stories and pictures of life on the Plains. Sales of the book have been brisk, with a second printing in discussion. The group has developed a webpage, http://germanrussiacountry.org, a blog, www.dasguteessen.com, and a Facebook page, https://www.facebook/GermanRussionCountry. The work that continues through monthly meetings of the Tri-County Tourism Alliance focuses on historical preservation, scenic travel routes and byways, and gathering information for a second effort titled, *Women Behind the Plow,* that tells the story of the German-Russian women involved in agricultural life on the prairie.

Strengthening Rural Communities through Extension's Marketing Hometown America

Working with Nebraska and South Dakota Extension colleagues, NDSU Extension Service personnel developed and pilot-tested a program to help small rural communities attract new residents while maintaining their identity and unique characteristics that make them a place people want to call home. Two communities, Ellendale and Edmore, tested the effectiveness of the materials taking similar, yet different paths. The materials were built on some earlier multi-state work that examined factors that made a community appealing to long-term residents, those just moving in and those who were considering making such a move. Residents participated in work groups to understand and identify community assets. By having a mixture of people in the room, individuals better understood how some things appeal to one group or another. Communication was increased and improved. A common response in evaluations was how often people were surprised about how many positive assets a community had. With this better awareness, participants indicated that they would speak differently of their community as a way to market it to family, friends and passersby.

Edmore residents participate in work groups to understand and identify community assets.

CROP MANAGEMENT

Pest Management Application for Smartphone and Tablet Users

Three NDSU Extension Service publications are now available as one application for smartphone and tablet users. The free app combines information from the "North Dakota Weed Control Guide," "Field Crop Plant Disease Management Guide" and "Field Crop Insect Management Guide" into one user-friendly electronic medium. The app gives users the ability to search by crop or pest to find solutions to problems or recommended treatments. Growers are also able to save or mark their favorite areas. Pictures of pests, weeds and diseased plants are included to make in-field comparisons. Crops included in the app are corn, soybeans, dry beans, sunflowers, sugar beets, potatoes and small grains. Additional crops may be added in the future. Because the app is a dynamic tool, it can be updated at any time with the latest information. Since release in 2014, the app has been downloaded approximately 3,000 times. Development of a PC version mirroring the app is currently under way.

Launching Unmanned Aerial Systems Education

NDSU Extension personnel experimented with unmanned aircraft systems (UAS) during the 2014 growing season to develop an Extension UAS education program. Extension UAS activities during 2014 included using UAS to monitor crop and livestock at the NDSU Carrington Research Extension Center. They used fixed-wing and rotocopter aircraft with thermal, infrared and multispectral cameras to gather data from crop and livestock research projects. Extension personnel discussed UAS agricultural applications at all of the Research Extension Centers' Field Day tours in July, and conducted UAS flight demonstrations at the Big Iron Farm Show in September at West Fargo. The second day of the Precision Agriculture Summit scheduled for January 19-20, 2015 at Jamestown will focus on NDSU Extension's UAS programs.

NDSU Extension personnel experimented with unmanned aircraft systems (UAS) during the 2014 growing season to develop an Extension UAS education program.

NDSU Extension and Experiment Station personnel collaborated with the University of North Dakota's Center for Unmanned Aircraft Systems Research, Education and Training, which flew the UAS. Their objectives included finding out not only what can be accomplished with UAS in agriculture but also evaluating which applications are economically feasible. Crop management applications included conducting crop plant stand counts and identifying crop stress from nutrient deficiencies, insect and weed infestations. The researchers used UAS thermal cameras to monitor beef cattle body temperatures and feedlot surface temperatures to mitigate stress from extreme weather conditions.

Extension personnel plan to gather more UAS experience during 2015 to develop an ongoing UAS education program for producers and agribusinesses.

Pest Scouting Yields Current Information for N.D. Producers

During the growing season, North Dakota producers need up-to-date information on pest risks to implement timely and appropriate management strategies. To provide that information, the integrated pest management (IPM) survey, coordinated by Extension state and area specialists, detects the presence and severity of diseases and insects that are threatening major crops. Field scouts survey locations in every county of the state and compile a variety of information, such as the presence or absence of major insect occurrences. Overall IPM benefits include:

- Reduced crop loss and improved crop quality
- Judicious use of pesticides in combination with nonchemical strategies, which results in improved protection of environment and health
- Reduced pest resistance
- Increased partnerships among growers, commodity groups, universities, crop consultants, industry and agencies to improve pest management
- Implementation of improved strategies and products through research

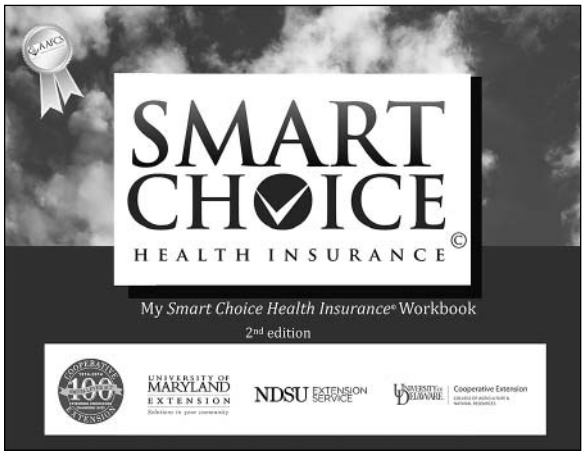
The survey information is provided at least once a week to stakeholders by agricultural email lists, county agriculture alerts and other electronic, radio and print media. Weekly maps of pest occurrences are also posted on the Web. Crops surveyed in 2014 were wheat, barley, soybeans and sunflowers. Scouts surveyed a total of 3,491 wheat, 327 barley, 1,261 soybean and 315 sunflower fields. In addition to surveying fields; scouts set out traps for sunflower insects and two exotic insect pests, and collected soil samples from wheat fields for exotic nematode detection. Scouts operated out of the Dickinson, North Central (Minot), Williston, Carrington and Langdon Research Extension Centers and the Main Station in Fargo.

FAMILY ECONOMICS

Smart Choice: Education on Health Insurance

Health insurance is quickly becoming one of the most expensive and confusing items that people purchase every day. Navigating the world of co-pays and co-insurance makes buying and using health insurance overwhelming to most people. Many people in North Dakota do not understand and know how to choose health insurance policies. *Smart Choice* is an educational program that helps individuals understand the vocabulary, wade through the options, and become educated consumers.

Smart Choice, a national Extension effort, was launched as a pilot program in eight states, including North Dakota. Results from multiple counties in North Dakota where it's first being piloted have been impressive with the 335 participants to date experiencing a 40 percent increase in confidence when choosing health insurance for their needs; a 48 percent increase in estimating how much they will pay for health insurance; a 34 percent increase in likelihood they will understand how much they pay for emergency services; a 41 percent increase in comparing how insurance plans differ; and a 22 percent increase in understanding terms. This program will be expanded throughout the state in the future.



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$MARTZ Preps High School Students for Managing Money

High school seniors in the U.S. graduate with very limited financial skills. Many schools provide limited financial education to the majority of their students. However, research indicates that even a small amount of financial education can have a positive effect on financial behavior. More emphasis with high school students is key to changing financial knowledge and skills.

NDSU Extension Service teamed up with Minot State University, and Town and Country Credit Union to offer Minot high school students a unique financial education experience on the topics of saving, investing, credit, budgeting and financial aid for college. The program has been ongoing for six years and recently was expanded to the Fargo area with support from NDSU. A total of 407 students from 23 high schools participated in 2014. Both sites will participate in 2015 with the possibility of adding new sites across the state.

Results indicated that 34 percent of students better understood the value of saving; 92 percent increased knowledge of money topics; 87 percent better understood college costs and financial aid; 84 percent better understood credit cards and loans; 44 percent were going to start saving money; and 19 percent would begin to make a budget.

FARM BUSINESS MANAGEMENT

Educating Producers on the Farm Bill

The 2014 farm bill gives agricultural producers a chance to make decisions that could affect them for years to come. To help them make the right decision for their operation, NDSU Extension Service farm management specialists and agricultural agents are educating producers about the legislation's provisions. For example, the bill gives producers an opportunity to update program yields which are a factor in the size of payments under the Price Loss Coverage program. The new farm bill also allows producers to reallocate their base acres or change the mix of crop bases. Extension efforts to help producers include:

- Prior to spring planting Extension farm management specialists made presentations to over 1,800 farmers and others about the program provisions and options.
- Over the summer Extension specialists teamed up with staff from the North Dakota Farm Service Agency (FSA) to provide intensive training for Extension agents and county FSA directors at six locations across the state.
- During fall 2014 Extension and FSA staff conducted 10 producer informational meetings around the state with about 1,700 producers in attendance. In addition, Extension personnel presented farm bill education to about 400 agricultural lenders at the annual Ag Lender Outlook Conferences held at three locations.
- Farm bill education will continue throughout the winter months with Extension agents and local FSA staff holding numerous county meetings.

NDSU Extension Service farm management specialists and agricultural agents are educating producers about the farm bill's provisions.

Agricultural Land Valuation Model Conversion

North Dakota Century Code mandates that the Department of Agribusiness and Applied Economics (AAE) at North Dakota State University annually compute an estimate of the average value per acre of agricultural lands on a state- and county-wide basis, and the average value per acre for cropland and non-cropland. These estimates, based on the model methodology and formulas specified by the North Dakota legislature, are provided to the Office of the State Tax Commissioner. The model determines agricultural land values as the landowner share of gross returns divided by a capitalization rate. Landowner share of gross returns is the portion of revenue generated from agricultural land that is assumed to be received by the landowner and is expected to reflect current rental rates. Through a grant from the Tax Commission Office, AAE upgraded the platform used to calculate the values to make it much more efficient and timely in analyzing scenarios. In addition, publications are available on running calculations as is a description of all of the calculations and results from the model.

Surface Considerations for Mineral Development

Oil and gas development continues in western North Dakota. The flurry of mineral leasing between mineral owners and mineral developers has subsided but it is being replaced by increased interaction between surface owners and energy companies as industry infrastructure, such as roadways and pipelines, are being built to accommodate the production of minerals. Questions about the relative legal rights and obligations of mineral developers and surface owners have escalated. Extension agents conducted three workshops in western North Dakota to answer questions about mineral leasing, mineral development, and the need for land on which mineral developers build and operate necessary infrastructure. The workshops couldn't address all of the questions or resolve the problems, but they did increase awareness for participants and Extension agents about the growing impacts of mineral development. Extension agents focused on helping individuals address needs but relied on state government leaders to address regulatory strategies. The need for additional information for surface owners continues to be emphasized by landowners, Extension educators, members of the legal profession, and other interested persons and organizations. One small piece to the overall puzzle will be developing a checklist of topics for surface owners to consider when interacting with mineral developers.

4-H YOUTH DEVELOPMENT

4-H Prepares Youth for Future

For more than 100 years, 4-H has played a key role in preparing youth to meet the challenges of tomorrow. As the state's largest research-based youth development program, 4-H is available to all youth ages 5 to 18 in every county in North Dakota. More than 30,000 youth participated in 4-H programs in the 2013-14 year in North Dakota. Youth participate through clubs, camping, special-interest groups, after-school programs and school-day enrichment experiences. 4-H also relies on the support of a remarkable number of dedicated adult volunteers and community members.

Today's 4-H continues to offer programs in subjects such as livestock judging, crops and consumer decision-making. To meet the changing needs of our North Dakota youth it also offers programs in areas including aerospace, communications, personal development and leadership, civic education, shooting sports, geospatial science, energy and robotics. Projects with the highest enrollment in 2013-14 were creative arts, food and nutrition, photography and shooting sports. The animal projects with the most enrollment were beef followed by horse.

4-H Science Utilizes Inquiry-based Learning

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

4-H's approach is to use inquiry-based learning to provide constructive learning through hands-on experience that help youth provide solutions to real world problems. Programs being conducted in this area include an aerospace event, GEAR-Tech-21 camp, robotics event, film festival and 4-H National Youth Science Day. Evaluations from the Maps & Apps 4-H National Youth Science Day experiment, related to geospatial science, indicated that over 73 percent of the youth participating in this experiment made them more interested in science and over 83 percent indicated that this experiment helped them learn how to use science to solve problems.

North Dakota Military Youth Participate in 4-H Opportunities

North Dakota is home to over 8,000 military youth living on installations and in communities around the state. Military youth face extra life challenges with frequent moves and parental deployments. They can benefit from the extra support that 4-H provides. Since 2002 the Extension Service has provided targeted educational opportunities to serve this population of youth and their families.

Highlights of recent efforts include over 100 military-connected youth participating in camping opportunities, 35 youth enrolling in two new robotics clubs on the Grand Forks and Minot installations, 30 youth and parents attending a military family retreat, and seven youth participating in an Air Guard/Air Force Reserves day camp series where they learned the principles of flight, parts of the plane, navigation, airport operation, and about aviation careers.

Participants gained knowledge and reported planned changes in behavior as a result of their participation. Of the military youth who attended camp, 74 percent reported that they learned new things at camp and 100 percent reported making new military-connected friends. Parents reported that the educational programming that they participated in made them more aware of how their military life impacts the family and how this awareness will change how they spend time together and interact with each other. Military and community partners place a high value on 4-H's role in providing opportunities for military families.

Over 100 military-connected youth participated in camping opportunities,

HORTICULTURE AND FORESTRY

Garden Project Sharpens Science Skills and Improves Diets of Youth

Strong science skills are needed to help North Dakota's children compete in the global marketplace. The science skills of North Dakota children rank high in the USA, but the National Assessment of Educational Progress reports that 56 percent of eighth-graders in our state lack proficiency in science. A group of 260 children in 30 counties were recruited to evaluate 176 promising varieties of plants in their gardens. Each of these children worked with a parent or guardian to compare two varieties of a particular vegetable, herb or flower of their choice. The children documented which of the two varieties was healthier, produced the first harvest, produced more yield and had superior product quality (taste or floral appearance). Two hundred twenty-five children (87 percent) successfully conducted trials and submitted reports. This data was analyzed to identify superior vegetable, herb and flower varieties for North Dakota gardens. Results are published online and were presented to over 1,000 gardeners in 2014. This information has significant economic worth as the value of vegetables grown in North Dakota gardens is estimated at $56 million. A survey of parents revealed significant impacts of the program:

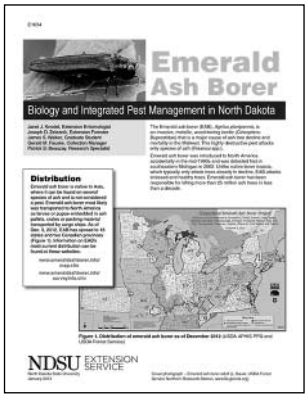
- Ninety-five percent of parents reported their children's nutrition improved due to participation in the project.
- Seventy-eight percent of parents reported increased levels of physical activity for their children.
- Ninety-five percent of parents reported improved science skills in their children.

Building Community Leaders through the Master Gardener Program

North Dakotans hunger for horticultural knowledge. During the growing season, they bombard Extension agents with requests for information and programming on selecting hardy plants, diagnosing plant diseases and pests, growing fruits and planting vegetable gardens. There is a need to train Master Gardeners and new Extension agents to provide science-based horticultural and forestry programming to meet the growing demand for information in their counties. In 2013, the Master Gardener Core Course trained 64 Master Gardener interns, seven Pro-Hort participants, and nine Extension personnel from around the state. Students could take the class in person on campus or in one of six interactive video network classrooms throughout the state. Other students watched the live web stream or recorded videos of the class from the convenience of their own homes. Students studied plant selection, entomology, soils, plant pathology, fertilizers and turf grass, as well as fruit and vegetable production. Each topic was taught by Extension or other NDSU personnel. The Master Gardener Core Course had a major impact. Surveyed class participants reported their level of gardening knowledge increased either moderately (48 percent) or a great deal (52 percent). Seventy percent are moderately to very confident that they can teach recommended gardening practices to home gardeners. Many participants reported that they will adopt more sustainable practices such as reducing their use of water and pesticides.

Bracing for Emerald Ash Borer

Emerald ash borer (EAB) is a pest of ash trees that has the potential to kill all of North Dakota's 78 million ash trees. Detection and trapping efforts of state and federal agencies are widespread but somewhat limited by available funding and personnel. Increasing the number of people actively searching for EAB drastically increases the state's ability to detect an infestation quickly, resulting in a swift response that will minimize the insect's impact. Since 2010, NDSU Extension and its partners, the North Dakota Forest Service and the North Dakota Department of Agriculture, have offered annual training sessions under the EAB First Detector program. The two main objectives of the program are to get participants to recognize the signs and symptoms of EAB and to understand the proper response to a suspected infestation. Additionally, several Extension products have been developed including a video and three publications on various components of EAB identification and management. A collaborative 'EAB Awareness Week' has also been developed that has participation throughout the state. Since the initial training sessions in 2010, over 200 people have been trained on various aspects of EAB detection, identification and management through the First Detector program. Over the four years, pre-and-post test results consistently show a 20 to 40 percent increase in knowledge of various aspects of EAB.



Several Extension products have been developed including a video and three publications on various components of EAB identification and management.

HUMAN DEVELOPMENT AND FAMILY SCIENCES

Gearing Up for Kindergarten

The transition to kindergarten is one of the most significant adjustments for children and their parents. National studies indicate up to 48 percent are not prepared for kindergarten and will need remedial help. North Dakota schools asked NDSU Extension Service to help design a program that will close the school readiness gap. Gearing Up for Kindergarten was developed with North Dakota families for North Dakota schools, and the data indicates it works. This school readiness program is unique because it involves parents and their four-year-olds at the same time, prior to entering school.

School districts that offer Gearing Up for Kindergarten will benefit from a significant difference in how the child and parents interact in the school system, how the child progresses through school, and money saved in services later. North Dakota data indicates that one child needing remedial math and reading support will cost an average $1,350. Gearing Up results indicates significant gains in academic skills and social-emotional skills. Current state support for Gearing Up provides funds to serve about 10 percent of North Dakota families and four-year-olds annually.

Stepping On: Assisting Seniors Stay Safely at Home

Every senior wants to age in place in their own home. However, falling in the home or in other public places is the number one reason for North Dakota seniors leaving their homes and entering more expensive care/living facilities. How can the number of falls be reduced? Education is key. A partnership between Extension family and consumer sciences agents and the North Dakota Department of Health-Injury Prevention and Control Division brought a new, nationally-recognized program to North Dakota seniors called *Stepping On.*

This program teaches seniors the key points to know and behaviors to change that will lead to fewer falls. The pilot program held in 2014 served 223 people, with an average age of 78, and half of them had fallen in the last year. Three months after the program, 88 percent of participants reported the program helped to reduce risk of falls to a great extent. Most encouraging was the fact that specific actions were taken after attending the class, that had not been reported before the class, including changes to safe footwear, having homes assessed for hazards, talking to vision experts or having an eye exam, practicing exercises taught in class, talking to doctors about the relationship between their medications and falls, and using safe mobility techniques as presented.

Parent Education Improves Essential Parenting Skills

Parent education classes and support are often categorized into three types; prevention, intervention and direct services. When social service providers and courts recommend parent education to families that are in their systems, intervention and services are usually offered by human service entities. When schools and community-based groups provide classes that are open to the general public, prevention and intervention classes are usually offered. Unfortunately, North Dakotans have access to a very limited number of prevention/intervention education options. The goal of the Parent Resource Center programs is to provide consistent, research-based programming at the prevention and intervention levels. NDSU Extension Service provides guidance and support to a network of parent educators that are located in eight human service regions. Parent educators may or may not be employees of NDSU Extension (social services and schools also employ parent educators). Demand for programming exceeds the capacity of the existing network and several areas of the state are underserved. Extension parent educators provide an average of 1,650 direct hours of parent education and support in the form of classes and individual support sessions to a state total of 12,000 participants.

Extension's parent educators are improving the lives of the families they serve. Evaluation of participants indicates that 89 percent found the program improved their parenting skills; 82 percent indicated the program reduced stress; 88 percent increased knowledge about where to get help in the community; and 97 percent increased their confidence in their ability to parent.

The Stepping On program teaches seniors the key points to know and behaviors to change that will lead to fewer falls.

LIVESTOCK MANAGEMENT

PregCard: Low Tech, High Impact

NDSU Extension personnel, private veterinarians and beef producers are collaborating on a novel effort to harness the power of collecting and analyzing routine cattle production data. Reproductive performance is an area of management that is paramount to profitability and therefore, the subject of many producer inquiries on a yearly basis. The PregCard system was initiated in 2012 and works by having participating veterinarians taking take a few minutes to provide summary information at the time of pregnancy, checking a group of cattle, then sending the cards to NDSU. To date, over 2,000 PregCards from 42 of 53 counties in North Dakota have been received, representing nearly 300,000 cows and heifers. Working together with veterinarians and producers has generated a powerful dataset to assess the impact of routine management practices on reproductive performance on a herd level; to provide veterinary clinics with benchmarking data and presentations for clinic meetings; and to provide summary reports to individual producers.

Beef Cattle Breeding System Sustainability

Research and Extension personnel are leading an effort to evaluate the sustainability of two breeding systems on beef operations throughout North Dakota. While artificial insemination (AI) is not new, the synchronization technology has evolved to the point where all cows in a herd can be AI bred on a single day and achieve pregnancy rates acceptable to many producers. Benefits of using AI and estrus synchronization can include shifting calving distribution, increasing weaning weight of calves and incorporating superior genetics of AI bulls. However, cattle still need to be gathered and handled a minimum of three times to accomplish timed AI protocols. To evaluate the production, performance and profit of each breeding system, producers, Extension agents and campus faculty work side by side to implement the breeding systems research and interpret results. Conducting research on commercial operations also offers students and Extension personnel opportunities to see science in action, understand and address a variety of concerns facing producers, and use this experience to help others with similar questions.

Small Meat and Food Processor Support

Increased government oversight of food processors, especially the upcoming implementation of the Food Safety Modernization Act (FSMA), has resulted in an increased need for technical assistance in Hazards Analysis Critical Control Point Systems (HACCP) and food safety plans. Many customers of North Dakota meat and food processors now require written documentation of food safety practices. The implementation of food safety plans has become a cost of doing business in the food industry. NDSU Extension is providing support and training for small meat and food processors, including HACCP courses, and answering calls and emails about regulations and HACCP deviations. In addition, assistance with the development of food safety plans, updating HACCP plans to meet changes in regulation, and conducting mock audits of HACCP and food safety plans has been initiated. The implementation of food safety plans has ensured continued access to markets for small food and meat processors located in North Dakota. By utilizing Extension, an estimated $100,000 in meat product was saved by providing opinions and evidence of product safety for 14 different meat processing plants in North Dakota. Moreover, over 50 contacts were made with small meat and food processors about upcoming regulations and changes in regulatory interpretation of food handling rules. Two HACCP courses were conducted to train 30 processors in HACCP and food safety procedures. Five mock audits were conducted providing feedback for the improvement of food safety plans. Small meat food processors indicate that the training and support are essential to continuing operations and interest is growing.

Research and Extension personnel are leading an effort to evaluate the sustainability of two breeding systems on beef operations throughout North Dakota.

NATURAL RESOURCE MANAGEMENT

Soil Salinity Education and Demonstration

As a result of salinity, nearly 90 percent of producers statewide are facing loss in productivity from reduced germination, stunted crop growth and poor range health. Salinization has been enhanced by the wet-cycle and shifts in management practices over the past 30 years in the eastern and central parts of the state. Locations most impacted by the wet cycle have seen higher water tables, transporting dissolved salts upwards into the rooting zone. Additionally, excess water in these locations has moved across the landscape, redistributing salts in surface and rooting zone locations. Producers are looking for education opportunities on the basics of salinity and guidance on management strategies. A network of eight salinity demonstration sites was established across eastern and central North Dakota to increase awareness of salinity issues, demonstrate salinity management options and provide learning opportunities. Field days were held at five of these locations, and the 353 people who attended reported a general 25 percent increase in understanding of saline soil management.

A network of eight salinity demonstration sites was established across eastern and central North Dakota to increase awareness of salinity issues, demonstrate salinity management options and provide learning opportunities.

SHARE Farm: Whole Systems Approach to Soil Health

Soil health is of utmost importance in North Dakota since it supports the expansive agricultural industry which crosses multiple commodities and provides the basis for the economy in North Dakota. In addition to soil health, producers need to manage their operations for crops, pests, weeds, disease and their bottom line. Whole systems approaches are necessary for the success of farming operations. In response the Soil Health and Agriculture Research Extension (SHARE) Farm was developed on a quarter section of land in Richland County in 2013. This site provides a location for integrated, whole-system program development where long-term, research and Extension activities across multiple disciplines take place. An annual field day and producer education groups associated with the SHARE Farm are used as platforms to transfer ideas. In the past two years, over 350 producers, educators and those in industry received important information on whole systems management during the annual field day. Producer groups (also called café talks) are being used in conjunction with the field days to build relationships and provide the personal attention producers need in developing whole systems management plans. In 2013-2014, the café talks led to repeated contact with 20 or more producers and resulted in a 26 percent increase in producer comfort level with whole systems management. These producers were also 97 percent more likely to share the information they learned with other producers. Additionally, the SHARE Farm concept has directly impacted over 1,000 additional acres of surrounding fields with soil health building and whole system management practices.

Improving Soil Quality on Prevented Plant Acres

Walsh County and northeastern North Dakota experienced a very cold, wet spring and early summer in 2013. Large parts of Walsh County and the surrounding areas went unplanted, and there was a need to get cover on the ground for government programs and soil quality protection. This cover could potentially utilize excessive moisture and build the quality of the soil. Walsh County Extension was in year three of the Northeastern North Dakota Cover Crops Project funded by North Dakota SARE, and this difficult spring situation provided Extension personnel with the opportunity to use the education and experience gained through the project. Radio shows, news columns, press releases and relationships with private industry personnel were all used to promote the use of a diverse cover crop mix on prevented plant acres. Fifty producers from northeastern North Dakota and Walsh County sought advice on seeding cover crops. An estimated 10,000 acres were planted with a cover crop mix in the region. Turnips, radishes and pea mixes were popular. An added bonus of this management practice was providing important food and habitat for wildlife throughout the winter.

NUTRITION, FOOD SAFETY AND HEALTH

On The Move to Better Health

Childhood obesity has more than tripled in the past 30 years. Obese children are at higher risk for cardiovascular disease, with 70 percent showing at least one risk factor for cardiovascular disease. Obesity also increases the risk for diabetes, stroke, cancer and osteoarthritis.

On the Move to Better Health is a five-week, school-based curriculum for fifth-graders that is delivered by Extension Family and Consumer sciences agents. Program goals are to increase fruits, vegetables and calcium-rich foods in the diets of children and improve their fitness habits. Parents receive newsletters and participate in goal setting and other family-based activities.

From 2007 to 2013, 10,482 children and their families participated in On the Move to Better Health. Post-surveys with 2,100 children in 2012-13 indicated the following positive changes: 62 percent drank less soda; 59 percent chose more healthful snacks; 59 percent consumed more milk and other dairy foods; 58 percent increased their daily amount of physical activity; and 53 percent consumed more fruits and vegetables.

Surveys with 837 parents in 2012-13 indicated the following: 85 percent of families read the newsletters and 40 percent set a weekly goal; 42 percent indicated their family's fruit consumption had increased; 34 percent reported their family's vegetable consumption had increased; 20 percent reported their family's whole-grain consumption had increased.

Nourishing Boomers and Beyond

North Dakota is home to many people age 50 and beyond, and a large part of this population falls into the baby boomer category. This age group expects to live long and wants to remain healthy and active into their later years. Boomers also want their information delivered in new ways. A new project was launched with support from the Extension Gerontologist and Extension Nutrition Specialist called *Nourishing Boomers and Beyond.*

Information delivery is done with a combination of website, social media and face-to-face options. This emerging program is growing monthly, and Google analytics indicate that people in North Dakota and beyond are using the website and following its social media. Each lesson focuses on the impact of healthful eating and physical activity with good health outcomes. For example, nourishing your brain targets the steps one can take to keep mentally alert and focused. The Brain Health Center from AARP and many other key resources are featured during each lesson.

SNAP-Ed and EFNEP Support Nutrition Decisions of Families in Need

Although North Dakota has one of the lowest poverty rates nationally, seven counties in North Dakota are in persistent poverty and one in twelve North Dakotans struggle with hunger. North Dakota households with children are twice as likely to be food insecure. Poverty and food insecurity are strongly correlated with negative health outcomes, including obesity and chronic diseases like diabetes and heart disease. Efforts are needed to help struggling families in North Dakota.

In North Dakota, the Family Nutrition Program (FNP), and the Expanded Food and Nutrition Education Program (EFNEP) serve low-income families and children to increase the likelihood that they will make healthful food choices and choose physically active lifestyles. These programs encourage more fruits and vegetables, whole grains, low fat dairy and balancing a healthy diet with physical activity. EFNEP and FNP also teach important food skills, including meal planning and basic cooking, to help learners stretch limited food dollars in healthful ways.

FNP reaches North Dakotans that are receiving or eligible for Supplemental Nutrition Assistance Program (SNAP) benefits by providing federally-funded SNAP Education (SNAP-Ed). In 2014, FNP provided classes to 11,147 participants, including 5,591 youth, and reached over 65,000 North Dakotans with events like health fairs and grocery store demonstrations.

EFNEP focuses on families with children in the household and school-aged children. In 2014, 126 adults graduated from EFNEP and reported improvements in nutrition, food safety, and food resource management practices. North Dakota EFNEP participated in a multi-state cost-benefit study that found that every $1 spent on EFNEP provides a return of $8.82 in benefits, including health care savings.

Evaluation shows many benefits from FNP and EFNEP programming. After classes, 88 percent of youth eat more fruits and vegetables, 75 percent choose milk over soda, and 89 percent are more physically active. After adult programming, over 70 percent of adults adopted at least one habit to spend their food dollars more wisely.

In 2014, FNP provided classes to 11,147 participants, including 5,591 youth

NDAES
Main Research Station

Main Research Station

North Dakota Agricultural Experiment Station

Agency Statutory Authority

ND Constitution Article XIX; North Dakota Century Code Chapter 4-05.1.

Agency Description

The North Dakota State University Main Research Station is located on the campus of the North Dakota State University of Agriculture and Applied Science. The station is the administrative location of the North Dakota Agricultural Experiment Station. The station conducts research and coordinates all research activities of the Agricultural Experiment Station. The purpose of the research is the development and dissemination of technology important to the production and utilization of food, feed, fiber, and fuel from crop and livestock enterprises. The research provides for an enhancement of economic development, quality of life, sustainability of production, and protection of the environment. The Main Research Station keeps detailed records of all activities and publishes the information that will be of value to the residents of this state.

Agency Mission Statement

The agricultural experiment station shall develop and disseminate technology important to the production and utilization of food, feed, fiber, and fuel from crop and livestock enterprises. The research must provide for an enhancement of the quality of life, sustainability of production, and protection of the environment.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

The NDAES continues to focus on developing an infrastructure in which to do quality research. Shortfalls occur in laboratory research facilities, especially those for plant-based field research laboratories at the Main Station. Cereal and grain quality laboratories, critical to maintaining and enhancing quality parameters for new crop varieties, are in desperate need of renovation/replacement. Developing separate laboratories for quality evaluation of transgenic experimental breeding lines also is required, due to the separation of transgenic material required by Federal policies on transgenic material. Laboratory space at the Main Station needs to be renovated/enhanced in order to carry out both applied and fundamental research on crops and livestock. Increased state operating costs are being experienced due to state fleet rate/policy change.

Disease evaluation by the Veterinary Diagnostic Lab is critical for our livestock industries to thrive, yet this facility is in jeopardy of losing accreditation due to its deteriorating condition. Similarly, the Meat Science laboratory, built in the 1950's and last renovated in 1970's is in very poor condition. A new facility is needed to allow our scientists to carry out cutting-edge research in meat quality, meat science, muscle quality and physiology. The new facilities, specifically the new agronomy labs at the RECs, as well as the AES greenhouse and the new animal research complex at the Main Station, have had strong positive impacts on the ability of NDAES scientists to carry out high quality research in these state-of-the-art facilities.

New technologies in crop development will provide novel methodology to incorporate disease, insect, and environmental stress resistance, thereby improving the overall adaptation of our many crops grown in the state. Our scientists travel farther each year in the state to conduct site-specific research to control wheat and barley scab (an ongoing problem) and other important yield-limiting diseases of crop commodities grown in the state. Addressing new issues, such as wheat stem sawfly, new races of existing diseases for which these is little resistance, and identifying and responding to livestock producer concerns over outbreaks of zoonotic diseases are fundamental to the mission of the NDAES. Major problems occur in acquisition of costly field and laboratory equipment that cannot be obtained through grants. NDAES has insufficient laboratory space to meet the needs of 21st Century agriculture.

North Dakota is becoming increasingly urban, and urban populations require some products and services that are different than those needed by livestock and crop producers. Continual efforts to improve horticultural research are occurring, and NDAES is actively evaluating new research and demonstration programs in this area. Enhanced efforts in areas including, but not limited to, food safety, food security, natural resources management, new bioproducts (including fuel) need to continue in order to allow NDAES to serve this segment of agriculture well. A systems approach for livestock research, literally from conception to consumption, is identifying ways to better serve this important sector of the North Dakota agriculture.

Our strength is in our scientists and staff, but they are too few to cover all of the critical issues facing North Dakota agriculture, and the lack of adequate numbers precludes important scientific achievement. While we are proud to provide a high level of applied research that is readily transferred to our stakeholders, some areas of fundamental research have become important to improve the efficiencies of our plant and animal-based applied research. Genomics, bioinformatics, and epigenetics all have their basis in fundamental research, but they provide products and expertise to enhance plant breeding (through genomic selection, marker-based selection) and livestock genetics (evaluating environmental influences on genetic expression). For some units, additional technical support would significantly increase productivity of researchers.

Scientists are responsible for attracting external funding, and their success during this biennium is impressive; however, the effort to write more, and larger, grants is apparent, and we have concern that significant research efforts at the Main Station and the RECs rely almost exclusively on extramural funding. Economic realities often place the NDAES in a position of responding rather than being proactive in affecting positive change. Our efforts to develop close collaborative relationships with industry and other scientific organizations will help allow the NDAES to become more proactive in solving problems critical to the state's largest industry.

North Dakota Agricultural Experiment Station

Update of NDAES Initiatives Funded in 2011-13 Budget

- **Costs to continue FY2011 salary increases**
  $1,079,647 received and allocated July 1, 2011

- **Greenhouse utilities**
  $173,622 added to previous biennium funding; allocated

- **Enhancing Soil Productivity and Land Management for Future North Dakotans**
  $1,410,000 received
  - $570,000 salary and fringe benefits, 1.0 FTE Scientist; hired Main Station – 2.0 FTE Scientists; hired at Hettinger REC and Carrington REC
  - $120,000 Operating; distributed
  - $720,000 salary and fringe benefits, 6.0 FTE Research Specialists; hired at Hettinger REC, Carrington REC, Williston REC, Central Grasslands REC, and Main Station (2)

- **Infrastructure (equipment, operating, graduate students and office support staff)**
  $1,880,000 received
  - $200,000 Equipment, REC and Main Station revolving equipment funds; allocated
  - $410,000 Main Station operating funds allocation per SY added to previous funding; allocated
  - $720,000 Graduate Research Stipends; allocated
  - $550,000 5.0 FTE Office Support Staff; hired Main Station

- **Improving the State's Economy by Enhancing Crop Development Efforts**
  $210,000 salary and fringe benefits, 1.0 FTE Scientist-canola breeding/genetics; hired
  $280,000 other fund authority for canola; positions filled

- **Improving Animal Productivity and Livestock Stewardship for Increased Profitability in the North Dakota Livestock Industry**
  $240,000 salary and fringe benefits, 2.0 FTE Research Specialists; hired Main Station

- **Director-Williston REC – contingency appropriation**
  $210,000 salary and fringe benefits, 1.0 FTE
  Agreement with Montana State University Eastern Agricultural Research Center dissolved, hired Director January 2012.

North Dakota Agricultural Experiment Station

Update of NDAES Initiatives Funded in 2013-15 Budget

- **Costs to continue FY2013 salary increases**
  $1,142,646 received and allocated July 1, 2013

- **Crop initiative: Enhancing crop development and protection efforts**
  $1,815,000 received
  - $1,160,000 Increased operating support: barley, corn, pulse, soybean, wheat, canola, cereal diseases, dry bean and pulse diseases- Main Station, crop pathology - CREC, variety testing- LREC, dryland crop improvement - DREC; allocated
  - $355,000 salary and fringe benefits, 2.0 FTE, Nematologist and technician; hired at Main Station
  - $300,000 NDAWN support
    - $120,000 salary and fringe benefits, 1.0 FTE technical support; hired
    - $80,000 increased operating ; allocated
    - $100,000 software & hardware; allocated

- **Enhancing research capacities at REC's**
  $1,210,000 received
  - $560,000 operating support - LREC, CGREC, NCREC, WREC, HREC, CREC, DREC; allocated
  - $200,000 salary and fringe benefits , 1.0 FTE to focus on chemical & cultural control of weeds & plant pathogens in western ND - HREC; hired
  - $450,000 salary and fringe benefits , 3.0 FTE technical support- CGREC, NCREC, CREC; hired

- **Agronomy laboratories**
  $5,925,000 received for the following:
  - CREC - $2,500,000
  - HREC - $1,800,000
  - LREC - $1,225,000
  - CGREC - $400,000

  Construction is in progress for Carrington, Hettinger, and Langdon

  Central Grasslands project on hold
  (See facilities page 37)

- **Equipment: Vet diagnostic lab**
  $400,000 received and allocated
  The NDSU Veterinary Diagnostic Lab purchased a liquid chromatography/mass spectrometer to expand forage testing for harmful mycotoxins occurring in moldy storage feedstuffs, additional spectrophotometers to expand livestock water testing for potentially toxic chemicals, a stereo microscope to identify harmful blue-green algae in livestock water samples, and a steam sterilizer to maintain uniform sterile testing requirements

- **Permanent oil tax trust fund** (Dickinson REC)
  $800,000 received and allocated

- **Grasslands recovery: Souris River flooding research funding**
  $82,000 received; Post doc hired
  (See Souris River research report page 53)

- **Animal science position**
  $140,000 received; hired

Additional Item

The RECs received $14,500 (DREC $4,750, HREC $1,750, NCREC $3,750, WREC $4,250) from the general fund pool appropriated to the Office of Management and Budget (OMB) for needs resulting from energy development. These amounts were paid to employees at the previously listed RECs.

2013-15 Legislation that Included Reporting Requirements to 2015 Appropriation Committees

SB2020 (NDSU Research & Extension, & Agronomy Seed Farm)

SECTION 2. ONE-TIME FUNDING - EFFECT ON BASE BUDGET - REPORT TO SIXTY-FOURTH LEGISLATIVE ASSEMBLY. The following amounts reflect the one-time funding items approved by the sixty-second legislative assembly for … the 2013-15 one-time funding items included in the appropriation in section 1 of this Act:

One-Time Funding Description
Agronomy laboratories - $5,925,000
~~Oil impact assistance - $100,000~~ [This was an error in the bill, per -OMB]
Main Station vet diagnostic equipment - $400,000
Souris River flooding - $82,000
Total general fund - $6,407,000

The 2013-15 one-time funding amounts are not a part of the entity's base budget for the 2015-17 biennium. The main research center shall report to the appropriations committees of the sixty-fourth legislative assembly on the use of this one-time funding for the biennium beginning July 1, 2013, and ending June 30, 2015.

- **Agronomy laboratories** – $5,925,000
  Status: $5,925,000 received for the following:
  - CREC - $2,500,000
  - HREC - $1,800,000
  - LREC - $1,225,000
  - CGREC - $400,000

  Construction is in progress for Carrington, Hettinger, and Langdon

  Central Grasslands project on hold
  (See facilities page 37)

- **Main Station vet diagnostic equipment** – $400,000 received and allocated
  Status: The NDSU Veterinary Diagnostic Lab purchased a liquid chromatography/mass spectrometer to expand forage testing for harmful mycotoxins occurring in moldy storage feedstuffs, additional spectrophotometers to expand livestock water testing for potentially toxic chemicals, a stereo microscope to identify harmful blue-green algae in livestock water samples, and a steam sterilizer to maintain uniform sterile testing requirements.

- **Souris River flooding research funding** – $82,000
  Status: Post doc hired
  (See Souris River research report page 53)

SECTION 4 DICKINSON RESEARCH EXTENSION CENTER – MINERAL RIGHTS INCOME. The Dickinson research extension center may spend up to $755,000 of revenues received during the 2013-15 biennium from mineral royalties, leases, or easements for ongoing operational expenses. Any revenues received in excess of $755,000 may be spent only for one-time expenditures for the biennium beginning July 1, 2013, and ending June 30, 2015.

Status: Oil Revenue received July 1, 2013 to November 30, 2014 - $274,078

SECTION 5 WILLISTON RESEARCH EXTENSION CENTER – MINERAL RIGHTS INCOME. The Williston research extension center must retain all revenues received during the 2013-15 biennium from mineral royalties, leases, or easements in the Williston research extension center fund and shall report to the sixty-fourth legislative assembly on the amounts received for the biennium beginning July 1, 2013, and ending June 30, 2015.

Status: Amounts received July 1, 2013 to November 30, 2014 - $488,530

SECTION 10 EXEMPTION. The amounts appropriated for the research greenhouse complex project, as contained in subdivision 4 of section 3 of chapter 48 of the 2005 Session Laws and subdivision 4 of section 1 of chapter 19 of the 2011 Session Laws, are not subject to the provisions of section 54-44.1-11, and any unexpended funds from these appropriations or related revenues are available and may be expended during the biennium beginning July 1, 2013, and ending June 30, 2015.

MAIN STATION CARRYOVER STATUS

	Authorization		Total Expense as of 11/30/2014
	GF	OF	
AES Greenhouse Complex **Status:** Estimated completion - Spring 2015	0	$3,789,854	$1,569,044

Agronomy Laboratories

FACILITIES

2013-2015 Authorized Amount:

$2,500,000 received for Carrington REC Agronomy Lab:

- May 2013 – Legislature authorized funding as requested $2,500,000 in SB 2020.
- June 2013 - SBHE authorized NDSU to proceed with the construction of the agronomy lab in an amount up to $2,500,000.
- Groundbreaking - May 2014
- Estimated completion date - Spring 2015

$1,800,000 received for Hettinger REC Agronomy Lab:

- May 2013 – Legislature authorized funding as requested $1,800,000 in SB 2020.
- June 2013 - SBHE authorized NDSU to proceed with the construction of the agronomy lab in an amount up to $1,800,000.
- Groundbreaking - June 2014
- Estimated completion date - Spring 2015

$1,225,000 received for Langdon REC Agronomy Lab:

- May 2013 – Legislature authorized funding as requested $1,225,000 in SB 2020.
- June 2013 - SBHE authorized NDSU to proceed with the construction of the agronomy lab in an amount up to $1,225,000.
- Groundbreaking - July 2014
- Estimated completion date - Spring 2015

UNRANKED 2015-17 CAPITAL REQUESTS

Central Grasslands Agronomy Lab

- Funding of $400,000 received in 13-15 session. Bids received for project were significantly over budget. The amount requested is JLG Architects estimate to complete project as presented.

Agronomy lab CGREC- $783,796

With the addition of a forage agronomist at the CGREC, the center is in need of a forage lab building. Currently samples collected in the field by the scientist are processed in a corner of an equipment storage building with a dirt floor. The dust from opening the overhead door and moving equipment renders this area very dusty and difficult to keep scales and computers clean. The new building would house the forage drying ovens, computer, scale etc. for sample data processing. It would also house the grinders and equipment to process the forage samples in preparation for nutrient analysis.

MEMO

JLG 13079d Central Grasslands Ag Lab
Issued: May 5, 2014
Issued By: Todd R. Medd, AIA, NCARB

Per our coordination meetings regarding the budget for the NDSU Central Grasslands Agronomy Laboratory project in Streeter, North Dakota, NDSU requested that JLG Architects compile a statement of probable cost for the project based on recent bidding results as well as our understanding of escalation of construction costs in North Dakota.
NDSU requested that we compile this estimate based on the original requested program and plan layout that equated to a 2,800 sf building that included lab spaces, drying room, grinding room, staging areas, and required storage (please see attached drawings). Below is a summary of this statement of probable cost, please see attached information as well.

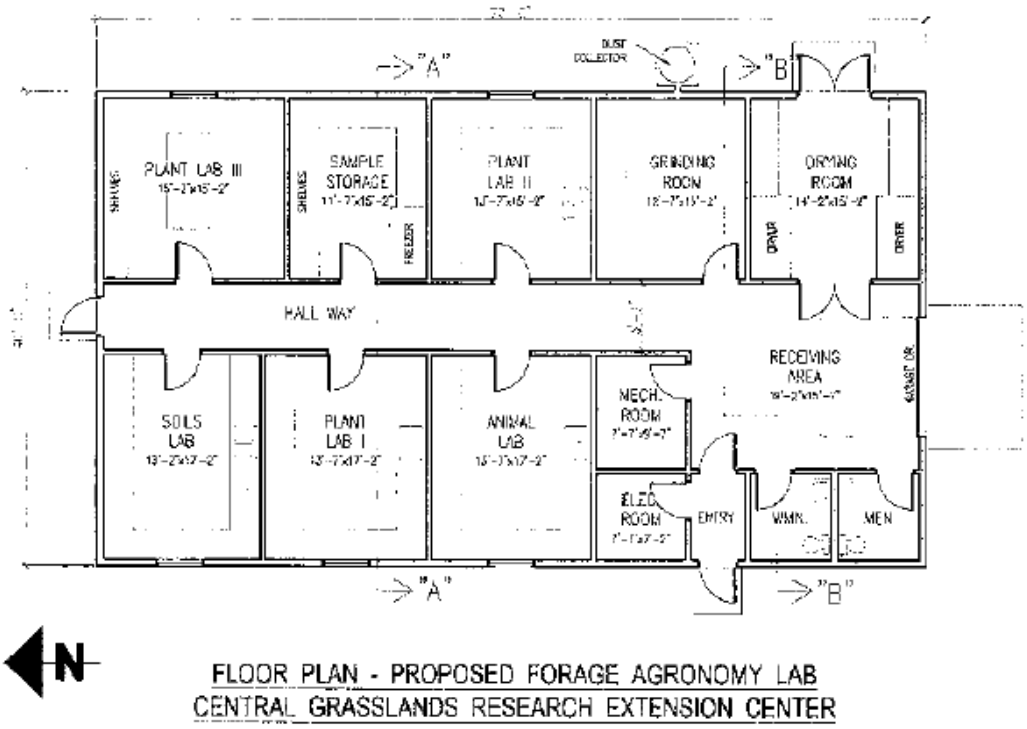
2,800 sf Forage Agronomy Lab Estimate of Probable Cost:

Building and Site Construction Cost Estimate:	$ 952,674.60
Construction Cost Escalation Estimate (5%):	$ 47,633.73
Owner Soft Cost Estimate:	$ 96,977.34
Furnishings, Fixtures and Equipment Estimate:	$ 53,750.00
Total Project Budget:	$ 1,151,035.67

Please note, JLG Architects estimates that construction cost escalation is anticipated to be 4-5% per year; the above estimates were calculated based on 2014 construction costs. Also note that the numbers above exclude project costs paid to date, and JLG Architects recommends that all construction projects maintain a minimum of a 3-5% construction contingency.

NDSU Agricultural Experiment Station
Agronomy Laboratories

Central Grassland REC proposed floorplan- Agronomy Lab



FLOOR PLAN - PROPOSED FORAGE AGRONOMY LAB
CENTRAL GRASSLANDS RESEARCH EXTENSION CENTER

Research Greenhouse Complex

Summary of Legislative Authorization

Source of funds		Authorization	
General Fund Appropriation			
	(2005-2007)	7,000,000	
	(2009-2011)	11,450,400	
	(2011-2013)	6,991,650	
	Subtotal		25,442,050
State Bonding			
	(2005-2007)		2,000,000
Special Fund Appropriation			
	(2005-2007)	5,000,000	
	(2011-2013)	2,502,931	
	Subtotal		7,502,931
	Total		34,944,981

An outline of the Main Station Research Greenhouse project process:

- Phase I of the Main Station Research Greenhouse Complex appeared as priority No. 1 in the 2004 NDSU Campus Master Plan for the Agricultural Experiment Station.
- This project was authorized in SB 2023 for the 2005-07 biennium in the amount of $7,000,000 including $2,000,000 in state bonding and $5,000,000 in other and federal funds.
- NDSU further requested and was granted carryover authorization for the project at the Jan. 18, 2007, SBHE meeting to continue to raise funds to meet the $5,000,000 goal in special funding, with the remaining $2,000,000 being provided by state bonding.
- The 2007-09 appropriation in HB 1020 included an additional $7,000,000 for the completion of Phase II of the three phase greenhouse project under the Main Research Center section and also carryover authority of $7,000,000 in funding authorized in 2005-07.
- The legislature also removed the designations of Phase I and II of the project, and furthermore, Section 14 of HB 1020 stated that the Main Research Center may

use any funding available within the total appropriation authority for the Main Research Center Greenhouse project to begin construction of the greenhouse with total cumulative authorization of $14,000,000.

- SB2020 in the 2009-11 Biennium provided $11,450,400 to fund additional construction.
- The NDAES was successful in raising additional funds for the special fund authorization that was approved for the project.
- HB1020 in the 2011-13 Biennium provided $6,991,650 (General Funds) and $2,502,931 (Special Funds) and the appropriation was declared to be an emergency measure. Of this appropriation, $383,625 (General Fund) was spent as an emergency measure. In addition, HB 1020 included a carryover provision for appropriations from previous sessions. These amounts (including greenhouse utilities) are expected to be spent by the end of the biennium as the project is completed.

Update: General Fund amounts completed previous biennium. Special Fund amounts from 2005 and 2011 Session Laws nearing completion as BL3 portion completion nears. Project to be complete this biennium.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2015-17 Program Initiatives as Ranked by SBARE

1 Bioinformatics

Situation: Bioinformaticists utilize sophisticated computer programs to identify the appropriate genetic codes responsible for desired traits by analyzing extremely large data sets. This important task is a bridge from geneticists to plant breeders and other researchers, with the ultimate goals of enhancing the efficiencies of plant breeding programs, understanding the genetics of disease and insect pests, and increasing the knowledge base in animal genomics.

Need: (3.0 FTE, Main Station) - $1,200,000

2 Precision Ag

Situation: Developing Unmanned Aerial System (UAS)-precision agricultural systems would offer agriculturalists in the state and nation increased opportunities to manage their resources for maximum profit. UAS technology, coupled with other precision ag technologies such as GPS instrumentation, variable rate technology, fertilizer placement options, soil and crop sensors, complemented with ground-based research on the large number of crops grown in the state, will provide needed momentum for N.D. to become a leader in the field, given that N.D. was designated as a Federal test site.

Need: Increased funding for operating; scientist and technician (2.0 FTE, Main Station) - $2,910,000

3 Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness

Situation: Research costs continue to escalate throughout the AES. This increased cost hampers the ability of scientists to carry out their research mission, reduces their ability to hire students, and limits their ability to purchase and utilize the necessary equipment that will allow them to carry out their research for the benefit of North Dakota.

Need: Additional funding for the Revolving Equipment Funds (Main Station and REC), additional GRA support (Main Station) - $1,900,000

4 Risk and Trade

Situation: Center for Ag Policy and Trade Studies (CAPTS) - The Center is the premier agricultural policy center in the region, currently evaluates state, domestic, and international policies that affect demand-supply of grains and net farm income. Analyzing farm policy and providing timely information relevant to the state's agricultural industries have been important to crafting farm policies beneficial to the state and addressing issues to increase competition of N.D. agriculture. **Risk Management -** Risk in agriculture has increased three to four times since 1980 and will continue to grow in importance as a management strategy, given the wide fluctuations in yield, prices, input costs, availability of crop insurance, land costs, and food safety. With the mix of crop commodities in the state (and the importance of these commodities), the need to develop risk management strategies is critical. The Commodity Trading Room provides a research lab for marketing information for farmers and outreach groups.

Need: Policy and trade issues research scientist (1.0 FTE Main Station); risk management support staff (1.0 FTE Main Station); increased funds for operating (Main Station) - $420,000

5 Enhancing Research Capacity at the RECs

Situation: The RECs play a very important role in carrying out applied research in the Agricultural Experiment Station. The addition of one technical support staff position in livestock research at Hettinger REC will greatly enhance research productivity and ease the burden of the only animal scientist at the Center, who also serves as Center Director. Dust created by extensive truck traffic servicing the oil industry in N.D. has led to a number of crop and livestock issues on farms and ranches in the Oil Patch. One technical support staff position located at Dickinson REC would allow scientists at the Main Station and other Centers to carry out research in the affected area to reduce the adverse effect of dust on crop and livestock productivity. Two new technical support staff positions at Carrington and Dickinson RECs in livestock research will enhance our research productivity using two vastly different systems for livestock production. The confined cow/calf research effort at CREC is known nationally for its research on a unique and profitable management system; similarly, the unique management opportunities in the short grass prairies of western N.D. are known in similar areas of the world, where livestock in semi-arid environment are important. New technical support staff are critical to expanding our livestock research enterprise. Western N.D. has seen an increase in the number of crops grown in the area in recent years. These crops are not without disease challenges, yet the closest plant pathologist in located at Carrington REC. A team of a plant pathologist and one technical support staff will allow the NDAES to provide expertise in plant pathology and disease management to farmers located in western ND and to address all of the crops that are "new" to the region.

Need: Technical support staff (1.0 FTE livestock, HREC), (1.0 FTE dust control research, DREC), (2.0 FTE livestock productivity and protection, CREC & DREC); plant pathologist and technician (2.0 FTE, WREC); increased funding for operating (all 7 RECs) - $1,270,000

2015-17 Program Initiatives as Ranked by SBARE (continued)

6 Genetics and Genomics Initiative

Situation: Epigenetics is the study of genetic expression modified by external environmental influences. Genetics of an organism codes the potential of the organism – the external environment affects the expression of many genes that influence final phenotypic expression of the organism (e.g., diet of the parents affecting carcass quality of the offspring). Understanding these external influences on gene expression may allow for enhanced benefits and profits to the livestock industry. **Statistical genomics** uses statistical methodologies to determine genetic linkages and markers beneficial to crop improvement programs. Statistical genomics works with bioinformaticists to interpret the data to meaningful information for use by plant breeders and geneticists for desired traits. **Metagenomics** is the method to study contributions the microbiome makes toward plant, animal, and soil health. It is the interaction of microbial genomics with plant and animal genomics, which may lead to greater efficiencies, less disease, and a greater understanding of epigenetic factors.

Need: Epigenetics scientist and technician (2.0 FTE, Main Station); statistical genomics scientist and support staff (2.0 FTE, Main Station); metagenomics scientist and technical support (2.0 FTE, Main Station); increased funding for operating - $1,305,000

7 Livestock Research to Enhance Productivity and Profitability

Situation: Microbiome Initiative - The microbiome is the ecological community of commensal, pathogenic, and symbiotic microorganisms that impact livestock production. Animal scientists will study the role of the microbiome in nutrition, disease, and environmental impact and, ultimately, human health. **Forage Nutrition -** Forage and hay represent the greatest amount of nutrition received by beef cattle in North Dakota. Differences in the nutritional quality of forages and hay affect growth, development, and productivity of individual animals, thereby affecting profitability of the livestock producer. Developing a program in forage nutrition can assist producers throughout the state on improving forage quality and potentially increase profitability. This will complement existing programs in forage management, nutrition management, and range management.

Need: Microbiome scientist and technical support (2.0 FTE, Main Station); forage nutrition scientist and technical support (2.0 FTE, Main Station) - $710,000

8 Food Safety/Global Institute for Food Security and International Agriculture

Situation: Food safety and security are identified as among the most significant topics globally. Each nation is concerned about food security – a food supply to nourish the citizens of a specific country, safe from environmental or created catastrophes, terrorism, and trade disputes. Similarly, food that is free from contamination and is safe to consume is critical to ensure the health of a country's citizens. Food Safety involves research collaboration across disciplines and Extension. The AES has several established food safety research collaborations and seeks to expand its capabilities to enhance the efforts of the new global institute.

Need: Increased funding for operating (Main Station) - $500,000

9 Soil Health Research Support

Situation: The rise of the oil industry in western N.D. may have long-term impacts on land quality, which may reduce agricultural productivity. Brine spills and soil compaction have reduced land quality and crop productivity in western North Dakota.

Need: Increased operating to build upon the Soil Health Initiative supported in the 2011-13 Legislative Session (Main Station) - $150,000

DETAILS:
2015-2017 Program Initiatives as Ranked by SBARE

North Dakota Agricultural Experiment Station

1. Bioinformatics

$1,200,000 Total General Fund Increase

$1,200,00 salary and fringe benefits, 3.0 FTE – Main Station

Bioinformatics is the utilization of very large data sets generated by genetic analyses. Bioinformaticists utilize sophisticated computer programs to identify the appropriate genetic codes responsible for desired traits by analyzing extremely large data sets. This important task is a bridge from geneticists to plant breeders and other researchers, with the ultimate goals of enhancing the efficiencies of plant breeding programs, understanding the genetics of disease and insect pests, and increasing the knowledge base in animal genomics.

2. Precision Ag

$2,910,000 Total General Fund Increase

$355,000 salary and fringe benefits, 2.0 FTE scientist and technician – Main Station
$2,555,000 increased funding for operating

Developing UAS-precision agricultural systems would offer agriculturalists in the state and nation increased opportunities to manage their resources for maximum profit. UAS technology, coupled with other precision Ag technologies such as GPS instrumentation, variable rate technology, fertilizer placement options, soil and crop sensors, complemented with ground-based research on the large number of crops grown in the state, will provide needed momentum for ND to become a leader in the field, given that ND was designated as a Federal test site. Operating funds to be used as source for in-house competitive grants, fostering teams across disciplines at Main Station and with other state entities, to address the broad range of issues in precision ag (eg. metadata, UAS, precision applications).

3. Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness

$1,900,000 Total General Fund Increase

$800,000 Graduate student funding – Increase pool of funds for additional 20 graduate research assistantships. – Main Station
$1,100,000 Revolving Equipment Fund (REF) – Increase fund, make it annual instead of revolving. – Main Station and RECs

Graduate research assistantships are critical to ongoing, vibrant research programs. These students are hardworking, intelligent, and driven to succeed. They carry out research under the supervision of scientists at the Main Station and RECs, and these research topics broaden the overall research agenda of AES projects. The students work for approved research programs in the AES, attend classes to improve their understanding of their respective disciplines, and also carry out their individual research topics. Access to a small pool of funding to increase the number of students in Agriculture has been very successful, not only in terms of enhancing research activities, but also by leveraging funds from other sources to increase the number of students. In 2011-13, the AES had funds for 20 students; departments and individual scientists were able to leverage these funds to increase the number of students to 36. Of these 36 students, 33 were from either the state (23) or region (10). Because of the strong Ag economy in ND, jobs are plentiful and many students will remain in the state upon graduation. This request is to provide funds for an additional 20 research assistantships.

The Revolving Equipment Funds for the RECs and Main Station have been very successful in allowing units to purchase expensive, but needed, equipment. The cost of field and laboratory equipment continues to increase – a small plot combine can exceed $300,000 and some specialized laboratory equipment can also exceed that price. Granting agencies assume that scientists have the equipment necessary to complete the work. Without the appropriate equipment, our scientists cannot be successful as they seek external funds to carry out their research programs. Increasing the REF for the RECs so that each REC will receive $150,000 each biennium rather than rotating across biennia will allow for more timely purchases and better planning of equipment purchases. Similarly, enhancing the Main Station REF by the same level to allocate funds to each unit every biennium will allow for better management and opportunities to leverage funds for the scientists that exist at the Main Station (allocation to units at Main Station is based on number of Scientist Years [SY] due to the varied size of Main Station units).

4. Risk and Trade

$420,000 Total General Fund Increase
$160,000 salary and fringe benefits, 1.0 FTE research scientist – Center for Ag Policy and Trade Studies (CAPTS) -Main Station
$160,000 salary and fringe benefits, 1.0 FTE support staff – Risk Management - Main Station
$100,000 increased funding for operating

Center for Ag Policy and Trade Studies (CAPTS) - The Center is the premier agricultural policy center in the region, currently evaluates state, domestic, and international policies that affect demand-supply of grains and net farm income. Analyzing farm policy and providing timely information relevant to the state's agricultural industries have been important to crafting farm policies beneficial to the state and addressing issues to increase competition of ND agriculture.

Risk Management - Risk in agriculture has increased 3-4X since 1980 and will continue to grow in importance as a management strategy, given the wide fluctuations in yield, prices, input costs, availability of crop insurance, land costs, and food safety. With the mix of crop commodities in the state (and the importance of these commodities), the need to develop risk management strategies is critical. Commodity trading Room provides a research Lab for marketing information for farmers and outreach groups.

5. Enhancing Research Capacity at the RECs

$1,270,000 Total General Fund Increase
$130,000 salary and fringe benefits, 1.0 FTE animal science technical support staff –HREC
$130,000 salary and fringe benefits, 1.0 FTE technical support staff (dust issues in western ND) – DREC
$260,000 salary and fringe benefits, 2.0 FTE technical support staff (livestock productivity and protection) – CREC, DREC
$330,000 salary and fringe benefits, 2.0 FTE scientist and technical support (plant pathologist for western ND) – WREC
$420,000 increased funding for operating; all 7 RECs

Hettinger REC (1.0 FTE, animal science technical support staff, HREC) The HREC is generally well equipped to carry out research activities on crop and livestock issues for southwest North Dakota. However, labor is limited on the animal science effort. The Center has a highly productive animal science research agenda, but the Director currently serves as the only animal scientist at the Center. Additional staffing is needed to help address the needs of the livestock industry and to offset the already high workload of the Center Director.

Dust issues in western ND (1.0 FTE, technical support staff, DREC)
Dust created by the extensive truck traffic servicing the oil industry in western ND has led to a number of cropping and livestock issues. These include, but are not limited to, reduced yields, inability/ unwillingness to harvest hay, and respiratory issues in livestock. The result is that dust is creating a negative effect on crop and livestock enterprises. Research to assist livestock and crop producers is necessary to identify ways to minimize this adverse effect on the agricultural industry in this region of the state.

Livestock Productivity and Protection (2.0 FTE technical support, CREC and DREC) North Dakota livestock producers are committed to producing the safest, highest quality food products possible. Increasing demand for our meat products nationally and internationally will require additional emphases on productivity and also will present additional opportunities for specialty markets. Through research, we can identify sustainable, profitable opportunities to improve livestock productivity in North Dakota.

Plant Pathologist for Western ND (2.0 FTE, scientist and technical support, WREC) There is an increasing level of crop disease problems occurring in western North Dakota due to changes in crop diversity, cropping systems, and crop rotation patterns. A plant pathologist is needed to evaluate and research crop diseases and impacts under both dryland and irrigated, no-till, and continuous cropping systems in Northwest North Dakota. The closest plant pathologist to western ND is located at the Carrington REC.

6. Genetics and Genomics Initiative

$1,305,000 Total General Fund Increase
$355,000 salary and fringe benefits, 2.0 FTE scientist and technician (epigenetics) – Main Station
$355,000 salary and fringe benefits, 2.0 FTE scientist and support staff (statistical genomics) – Main Station
$355,000 salary and fringe benefits, 2.0 FTE scientist and technical support staff (metagenomics) – Main Station
$240,000 increased funding for operating

Epigenetics is the study of genetic expression modified by external environmental influences. Genetics of an organism codes the potential of the organism – the external environment affects the expression of many genes that influence final phenotypic expression of the organism (e.g., diet of the parents affecting carcass quality of the offspring). Understanding these external influences on gene expression may allow for enhanced benefits and profits to the livestock industry.

Statistical genomics uses statistical methodologies to determine genetic linkages and markers beneficial to crop improvement programs. Statistical genomics works with bioinformaticists to interpret the data to meaningful information for use by plant breeders and geneticists for desired traits.

Metagenomics is the method to study contributions the microbiome makes toward plant, animal, and soil health. It is the interaction of microbial genomics with plant and animal genomics, which may lead to greater efficiencies, less disease, and a greater understanding of epigenetic factors.

7. Livestock Research to Enhance Productivity and Profitability

$710,000 Total General Fund Increase
$355,000 salary and fringe benefits, 2.0 FTE scientist and technical support (microbiome initiative) – Main Station
$355,000 salary and fringe benefits, 2.0 FTE scientist and technical support (forage nutrition) – Main Station

Microbiome Initiative - The microbiome is the ecological community of commensal, pathogenic, and symbiotic microorganisms that impact livestock production. Animal scientists will study the role of the microbiome in nutrition, disease, and environmental impact and, ultimately, human health.

Forage Nutrition - Forage and hay represent the greatest amount of nutrition received by beef cattle in North Dakota. Differences in the nutritional quality of forages and hay affect growth, development, and productivity of individual animals, thereby affecting profitability of the livestock producer. Developing a program in forage nutrition can assist producers throughout the state on improving forage quality and potentially increase profitability. This will complement existing programs in forage management, nutrition management, and range management.

8. Food Safety/Global Institute for Food Security and International Agriculture

$500,000 Total General Fund Increase

$500,000 increased funding for operating – Main Station

Food safety and security are identified as among the most significant topics globally. Each nation is concerned about food security – a food supply to nourish the citizens of a specific country, safe from environmental or created catastrophes, terrorism, and trade disputes. Similarly, food that is free from contamination and is safe to consume is critical to ensure the health of a country's citizens. Food Safety involves research collaboration across disciplines and Extension. The AES has several established food safety research collaborations and seeks to expand its capabilities to enhance the efforts of the new global institute.

9. Soil Health Research Support

$150,000 Total General Fund Increase

$150,000 Increased operating to build upon the Soil Health Initiative supported in the 2011-13 Legislative Session – Main Station

The rise of the oil industry in western ND may have long-term impacts on land quality, which may reduce agricultural productivity. Brine spills and soil compaction have reduced land quality and crop productivity in western North Dakota.

North Dakota Agricultural Experiment Station
Main Research Station

2013-2015 IMPACTS

- The average durum production in North Dakota over the last three years has been 36 million bushels, 92% of which were NDAES developed varieties. This results in a direct impact on the state's economy of $288 million dollars annually. Two new NDAES-developed durum varieties, Carpio and Joppa, have performed exceptionally well in their initial seasons. These cultivars possess excellent agronomic traits, combined with superior quality traits and disease resistance and are in great demand by durum wheat producers in North Dakota.
- The wheat quality testing lab ensures quality spring wheat varieties are grown in North Dakota which adds $6.4 billion in economic activity annually ($2.1 billion direct and $4.3 billion secondary). Additionally, the wheat quality program performs market development research to improve end-use applications of spring wheat both domestically and internationally.
- NDAES scientists are collaborating to develop strategies for partnering on wheat technology. One partnership has been created and 2 others are converging toward fruition. The impacts of these are strategic and would result in longer-term increases in productivity, cost reductions, and/or align NDSU breeding to major end-users.
- Cooperative work with wheat, barley, soybean, potato, and other breeding programs at NDAES has continued to lead in the development of disease-resistant germplasm and varieties for North Dakota. Research teams of breeders, geneticists, pathologists, entomologists, and cereal chemists have focused on developing materials that are well adapted to the climate and abiotic and biotic stresses, while maintaining the high quality for which North Dakota is known. The genetic resistance to a number of diseases across the wide range of crops grown in the state saves producers tens to hundreds of millions of dollars in disease losses and in fungicide applications each year.

Joppa is a durum variety released by the ND Agricultural Experiment Station in 2014.

- NDAES researchers have determined optimum timing for and rates of fungicide applications for crops or situations where fungicides are a necessary disease management tool. This effort helps identify new fungicide chemistries to control diseases. This work also assists North Dakota in obtaining Section 18 emergency exemptions of fungicides that increases fungicide options for producers. Proper and judicial use of fungicides has saves North Dakota producers tens of millions of dollars per year through disease control.
- Disease forecasting systems that were developed, maintained, improved, and/or made accessible to the public by NDAES scientists are important tools for managing a variety of important diseases on several crops such as wheat, barley, sugarbeet, potato, and canola. These systems help producers make "spray or no spray" decisions with regards to fungicide applications throughout the growing season. The timely application of fungicides is necessary to achieve disease control when and where needed. Equally important, the decision to not apply fungicides when they are not needed saves producers significant input costs.

- The newly developed NDSU Dry Bean weed control program uses micro herbicide rates to control annual weeds, which has increased yields up to 42% and resulted in an increased income of $95 million dollars to growers.
- The NDSU woody plant project has introduced 51 superior woody plants for production and sale with increased disease tolerance and winter hardiness for landscapes throughout the Northern Great Plains with a nursery wholesale sale value of $1 million and a $3.1 million value in retail sales.
- Growers have realized at least a 0.5 ton/acre increase in seasonal forage yield following the NDSU fall alfalfa harvest management program, which increases the crop value $86 million annually in the state.
- The Beef Cattle Research Complex has been utilized to conduct multiple research projects involving impacts on feed efficiency and feeding behavior. Results suggest that body composition, visceral tissue mass, pancreatic enzymes, and cellular metabolism are influenced by diet and may be differentially associated with differences in feed efficiency. In addition, we are gaining a better understanding of the impact of maternal nutrition on the offspring. A 5% improvement in beef cattle feed efficiency could result in a potential cost savings of over $14 million for North Dakota beef cattle producers.
- Research related to the interactions between nutrition and pregnancy outcomes have identified compounds that may increase blood flow to the uterus and ultimately improve embryo survival. A 1% increase in pregnancy rate in North Dakota beef cattle herds would potentially result in $11 million in increased revenue for North Dakota ranchers.

Research related to the interactions between nutrition and pregnancy outcomes have identified compounds that may ultimately improve embryo survival.

Testing done at the NDAES-Veterinary Diagnostic Lab mitigates animal losses and illness across the state of North Dakota.

- Research conducted by NDAES scientists demonstrated that a rapid test for penicillin residues could be implemented in cull sows. This test could improve food safety by reducing the risk of violative residue levels (and therefore antibiotic resistant bacteria) and reduce the chance that animals would be condemned in the slaughter process due to these residues. Conservative estimates indicate this testing procedure could save the US swine industry $10 million annually.
- Research has identified positive effects of canola oil on mammary cancer development. Development of additional canola-based food products or nutraceuticals may result from this research effort.
- Research conducted by NDAES scientists improved animal health by testing a drug for treatment of pain in farm animals. Better pain management contributes to improved profitability and a better image for agriculture and livestock producers with the general public.
- The NDAES-Veterinary Diagnostic Lab (VDL) processes approximately 10,000 cases a year from animal owners and producers in North Dakota and western Minnesota. The VDL provides timely, accurate diagnosis of animal health problems which then impacts treatment. This testing mitigates animal losses and illness across the state of North Dakota.

- NDAES scientists provided statewide leadership in applied research on UAS application in agriculture, and worked with many dealership, agriculture consultancies, government and economic development corporations leading to economic development of the state.
- Evapotranspiration modeling and irrigation research carried out by AES scientists helped the ND State Water Commission determine that widespread irrigation in the Devils Lake basin will not help with flood mitigation. As a result, planned pilot and full-scale projects were not implemented, which saved over $30 million.

Evapotranspiration modeling and irrigation research carried out by AES scientists helped the ND State Water Commission determine that widespread irrigation in the Devils Lake basin will not help with flood mitigation, which saved over $30 million.

- The population projections of the Western Area Water Supply Project's (WAWSP) service area continue to increase. The most recent estimate, 160,000 people by 2038, is a huge increase from the estimates used in 2010. These efforts are at the forefront of the allocation of millions of dollars to assist western North Dakota as they adjust to shale oil development. With the significant projected population growth, the total estimated water supply project cost has increased to $460 million.
- A predictive model that forecasts peak flight of the sugarbeet root maggot was developed by correlating 15 years of NDSU fly count and weather data. The model is publicly available on the NDAWN website and as a mobile app for iPhone and Android devices, and it is incorporated into a "text alert" system that notifies subscribers when to apply insecticides for optimal control. This system is widely used by growers, sugar company agronomists, county Extension personnel, and other agricultural advisors throughout the Red River Valley to help control this pest.
- As energy development has increased in western ND, the amount of road dust created has also increased. Dust is an area of concern for the industry, community leaders, as well as citizens; but little information has been available on how much is being created. This study found that areas of increased travel received 212% more dust 10m from the road, 30% more dust 40m from the road, and 24% more dust 80m from the road when compared to areas of low impact (typical western ND travel prior to recent oil development). The most dust was produced during the summer when compared to other seasons. During the 2- year study, dust did not significantly impact water quality, soils, or the condition of wetlands studied.

North Dakota Agricultural Experiment Station
Main Research Station

Souris River Research Report

Issue: Assessment of how flooding durations impact long-term soil and rangeland quality and the associated declines to ranching productivity and related treatment options to bring back forage quality.

An emergency appropriation of $80,000 was provided by the Legislature to the North Dakota Agricultural Experiment Station (NDAES) in June 2013 to have NDAES personnel conduct research and assess the problem. The following is what has been conducted so far on this project:

1) NDAES scientists visited the Souris River in June to finalize project locations and coordinate sampling dates and equipment. Flood waters were again high throughout much of June and July 2014 and delayed sampling. However, faculty and technicians revisited the location in early August and conducted field sampling.
2) To better understand the flooding implications, seven sampling sites were selected stretching nearly 30 miles upstream and downstream of Towner, ND. The sites encompassed the wide ranging landscape features and agricultural practices in the region. Additionally, we assumed that flood impacts were greatest closer to the river. Therefore, we sampled transects at multiple distances from the river to include locations holding water for longer periods of time.
3) Field sampling was separated into belowground and aboveground to link soil processes with plant communities. Along each transect, plant species composition and abundance was estimated. Soil samples were also taken at three depths and sent to the NDSU Soil Testing Lab for chemical analysis. Surface soil was collected and incubated in the NDAES Research Greenhouse Complex to determine the viable seed bank.
4) Soil chemical analysis and seed bank incubation was completed in mid-December with results forthcoming. We plan to link the soil parameters with both the plant community and viable seed bank to determine the restoration/recovery potential of each site and what factors (if any) are limiting the site from reaching that potential. Once we have a better idea of what the underlying problems are, we can tailor restoration/recovery solutions around the problems. For example, desirable plants may exist in the seed bank, but not expressed in the plant community due to an underlying soil condition (adding additional seed may not be necessary if it is already in the soil). Alternatively, the seed bank may only include invasive or noxious weeds, thus requiring direct planting. Further, we have elevations for each of our sampling location which, when combined with regional elevation and soils maps, enables us to make tailored restoration/recovery recommendations to the broader region.
5) Moving forward with the project, we plan to complete the laboratory and statistical analysis winter 2015. As we develop conclusions and restoration/recovery recommendations we will work with both regional and local Extension personnel to disseminate the information to interested stakeholders.

NDAES
Branch Research Centers

Agency Overview

Carrington Research Extension Center

North Dakota Agricultural Experiment Station

Agency Statutor Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The Carrington Research Extension Center was established in 1960. CREC operates on a land base of around 1,700 acres and has infrastructure to irrigate about 260 acres with center-pivot systems and 120 acres by surface methods. The balance of the acreage is managed as traditional dryland and is utilized primarily for dryland field crop research activities.

The research effort at CREC focuses on these general program areas: traditional crop variety evaluation, crop production and management, plant disease management, alternative crop development, cropping systems, irrigation, integration of crop and livestock production, intensive cow/calf production, beef cattle feeding, feedlot management, livestock waste and nutrient management, foundation seedstocks production, and development of new agricultural enterprises. Through these efforts, the CREC research program has gained a national reputation for its involvement in agriculturally-based economic development and study of a wide range of crops and cropping systems.

CREC maintains a strong Extension program as five extension specialists base their educational programming from the center. The extension program emphasis areas addressed by these specialists include: agronomy, plant pathology, irrigation, livestock, and livestock waste - nutrient management.

Agency Mission Statement

The Carrington Research Extension Center conducts research that will lead to the enhancement of agriculture and improve the quality of life across the central region of North Dakota. Specifically, the Carrington Center conducts research on both dryland and irrigated crop production methods and systems, improved crop cultivars, feeding of beef cattle, cow/calf nutrition, sustainable agricultural production, and produces foundation seedstocks. The objective is to discover the balance between farm enterprise profitability and conservation of the natural resource base. The results of these studies are disseminated to the entire state through an on-going extension educational program.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

A secure (owned or long-term leases) land base is critical to sustain the current and future research mission of the Carrington Center. The diverse and broad based programs of the CREC operate on a relatively small land base. For many years, the Carrington REC has operated on a land base of around 1,700 acres with the state owning around 840 acres. The remaining land base of more than 850 acres must be secured from annual rental agreements with multiple landlords. This heavy reliance upon a willing group of land owners to annually rent a significant portion of the minimum amount of acres the CREC requires is risky at best. If any one parcel of rented land were not made available in a given year, the CREC would be forced to greatly reduce or eliminate program contributions that are depended upon by North Dakota producers and are basic to our department mission.

A series of primary program facilities are further issues that need to be addressed to sustain the viability of the diverse programs at Carrington. These facilities influence worker safety concerns, program capacity and productivity, and impact operational costs.

The CREC's foundation seedstocks program is an important part of NDSU's seedstocks program as it produces and processes at least 25 varieties representing 6 to 7 different crops annually. The CREC is consistently challenged to process this diversity of foundation grade seed due to the limitations of the existing facility and other demands on staff during the field season. The CREC seed conditioning plant is in need of replacement since the current facility has very limited capacity and structurally is too small to accommodate needed upgrades in capacity and workplace safety.

The beef research unit desperately needs a multi-use 'feedlot research support facility.' This facility would expand the scope of research capabilities, assist in sustaining IAUAC compliance, address worker protection challenges, and reduce maintenance costs for equipment. An associated need for this program is an additional set of feedlot pens. Current pens are fully utilized and feedlot research projects are often backlogged. An additional set of pens would allow the CREC to conduct at least one additional experiment per feedout period. Alternatively these pens would allow more treatments or replications within other studies thereby expanding research capacity and quality. Any feedlot pen expansion must include associated waste containment facilities to remain compliant.

It is important that grant fund opportunities continue to be widely available in future years. Funds that support crop and livestock production or agricultural related issues in general are needed to leverage public funding. The CREC research programs must continue to have a diversity of opportunities to compete for grant funds that when successful allow us to most effectively empower current research programs.

Additional equipment storage buildings are needed to store the CREC research and farm-scale equipment from the elements. A significant amount of high cost and highly technical equipment must currently be stored outdoors due to storage space limitations.

Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- Soil health and soil fertility research projects have expanded greatly these past two years empowered by new staff from the Soil Health Initiative. Soil salinity, N mineralization, and crop response to nitrogen, phosphorus, sulfur fertility represent the current research focus.
- The CREC played an integral role in a multi-agency research project that investigated the effectiveness of UAS (unmanned aircraft systems) as a technology to gather information for managing crop and livestock production systems. The CREC's location within the Northern Plains Unmanned Aerial Systems Test Site allowed this "proof-of-concept" to collect data from UAS-mounted sensors flown above numerous CREC field research trials.
- Challenges of managing glyphosate resistant kochia are being investigated with a series of soybean studies in association with several educational programs designed to update producers on revised approaches to managing this emerging problem.
- The comparative efficacy of fungicides registered for control of Sclerotinia (white mold) on dry edible beans and soybeans was rigorously identified
- Improved methods were developed for screening sunflowers for resistance to Sclerotinia head rot that permit a more accurate assessment of resistance and more rapid progress breeding for resistance.
- Beef feedlot research investigating the effects of fat removal from distillers grains, a by-product feed from ethanol production, showed the fat removal has minimal impacts on steer performance.
- Demand for CREC information on managing cows in a year-round drylot beef cow production system continued to increase within the region and throughout the Midwest as land-use changes occur.
- Corn fungicide products and application timings are being extensively reviewed to assess the fit and benefit of this corn management strategy.
- An integrated project was conducted where energy/feed beets were established on a saline soil site to demonstrate a remediation option followed by utilization of the beets within a beef feedlot growing and finishing diet.
- Work investigating the effects on corn particle size when fed in feedlot diets with decreasing forage levels showed that corn particle size should vary with forage level in the diet for optimum digestion and steer performance.
- A soybean production reference table continues to be updated with new research that growers can use to make choices on optimizing yield based on factors including tillage system, previous crop, seed inoculation, seed treatment, planting date, row spacing, planting rate, starter P fertilizer placement and timing of weed control.
- Determined that raising beef cattle in a drylot system is a viable alternative beef management practice.

Improved methods were developed for screening sunflowers for resistance to Sclerotinia head rot that permit a more accurate assessment of resistance and more rapid progress breeding for resistance.

Agency Overview

Central Grasslands Research Extension Center – Streeter

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The CGREC conducts research for the Coteau region of North Dakota, an area bounded by the Missouri River on the west and the James River on the east and extends from Divide and Burke counties in northwestern North Dakota in a southeasterly direction through Dickey County. CGREC is located between two counties which rank in the top 10 counties for the production of livestock and forages. The area served by CGREC contains 5.0 million acres (44 percent) of the state's rangeland where 42 percent of the state's livestock is raised on 38 percent of the state's farms.

Research objectives must increase the range-carrying capacity of native range emphasizing conservation and preservation, stabilize grass production to compensate for the vagaries of the weather and precipitation as it influences forage production in the dryland agriculture, identify the impact of different management systems upon beef production in the central region and explore the increased use of crop residues and byproducts for the maintenance of the cow herd. CGREC's primary focus is management of grassland acreage which occupies about one-third of the agricultural land in the state and aims to improve production and increase returns to cattle producers.

Agency Mission Statement

The legislated mission of the CGREC is as follows: "The CGREC shall conduct research designed to fulfill needs within an area bounded by the Missouri River on the west and the James River on the east with research objectives as follows:

1. To increase the range-carrying capacity of native range with emphasis on conservation.
2. Stabilization of grass production to determine how to best compensate for the variability of the weather as it influences forage production.
3. Identification of different management systems on beef production in the central region of the state.
4. Exploration of increased use of crop residues and by-products for the maintenance of the cow herd.
5. To disseminate research results and information for the benefit of the state of North Dakota.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

Laboratory space, in the form of an agronomy lab, is needed to allow scientists the opportunity to expand current research and develop and implement new research projects.

Current livestock facilities are deficient for a fully implemented animal science program. Improvements to livestock handling and feeding facilities including replicated drylot pens, feed storage, and a new working barn are needed to allow for growth of the animal science research program.

Technical support is a critical issue. In order to strengthen current research programs, research specialist is needed for the animal science program.

Significant improvements or replacement of the director's residence is needed as the current residence has water, possible mold, and foundational issues in the basement.

Other facilities are in need of deferred maintenance funding. Specifically, roofing and windows on the technician residence, as well as updates to many barns and buildings located around the center are needed.

Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- Expanded research on control of invasive grass species through grazing to include a soil seed bank study, early intensive grazing study, and beginning fall 2014 a study incorporating both grazing and prescribed burning.
- Continued research projects evaluating a multitude of forage species for use in the northern plains. New projects include work with annual forage production systems and incorporation of annual forages in to cropping systems.
- The animal science program continues to expand collaborating with projects on reproduction, animal nutrition, and animal health. These collaborative efforts have resulted in two M.S. level graduate students completing degrees and three additional graduate students working on research projects based at Central Grasslands REC.
- Research in the area of cover crops also continues to develop. Currently research on cover crops is evaluating the impacts of plant biomass removal on subsequent soil health parameters.
- Addition of a new Area Extension Specialist/ Livestock Systems position tasked with supporting area producers with both range and animal science activities.
- Addition of a new technician position provided this past biennium which will provide support and leadership to the livestock and farm crew.

The animal science program continues to expand collaborating with projects on reproduction, animal nutrition, and animal health.

Agency Overview

Dickinson Research Extension Center

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The NDSU Dickinson Research Extension Center has an established record of service to the people in the 13-county region south and west of the Missouri River. The DREC operates 4,916 acres of owned land within the region as well as annual land leases needed to accommodate ongoing projects. The land base provides opportunities for a broad perspective in evaluating various agricultural systems that can serve as engines for economic development. This is a continuation of what has taken place for over 100 years. Currently, the DREC assists agricultural producers in solving production problems with agronomy, animal science and range science, while integrating new developments. Five major areas are served: agronomy, beef management, bio-security, range management, and sustainable agricultural practices. Faculty and staff are committed to engaging people of the region and to the identification of current economic opportunities, while sustaining natural resources for future generations as directed by the mission statement and Advisory Board. Research data and producer ideas are continually considered so the DREC can leverage the latest knowledge to best benefit the people of North Dakota.

Agency Mission Statement

The Dickinson Research Center must be located at or near Dickinson in Stark County. The Center shall conduct research on increasing the carrying capacity of native rangeland, with emphasis on conservation and preservation for future generations. The Center shall conduct research on grass production to determine how to best compensate for the vagaries of the weather as it influences forage production in the dry land agriculture of western North Dakota. The Center shall conduct research at the ranch location in Dunn County with beef cattle breeding, feeding, management and disease control for the benefit of livestock producers of western North Dakota and the entire state. The Center shall conduct research designed to increase productivity of all agricultural products of the soil by maintaining or improving the soil resource base in the dry land agricultural region of southwestern North Dakota by the identification of adapted crop species and superior crop cultivars; propagation and distribution of selected seed stock; and development of profitable cropping systems that achieve the necessary balance between profitability and conservation of all natural resources. The Center shall disseminate research results and information for the benefit of this state.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

Dust issues in western ND — Dust created by the extensive truck traffic servicing the oil industry in western ND has led to a number of potential cropping and livestock issues. These include, but are not limited to, reduced yields, inability/ unwillingness to harvest hay, and respiratory issues in livestock. The result is that dust is creating an undocumented and potentially negative effect on crop and livestock enterprises. Research to assist livestock and crop producers is necessary to identify ways to document and minimize any adverse effect on the agricultural industry in this region of the state.

Livestock Productivity and Protection — North Dakota livestock producers seek increased demand for meat products nationally and internationally. This demand will require additional emphases on documented beef production systems that capture additional marketing opportunities. To explore and enhance these opportunities, new forage and cattle resources need to be evaluated to meet market specific targets. Both grain-based and forage-based beef production systems need additional evaluation. Through research, we can identify profitable opportunities to improve livestock productivity in North Dakota.

Deferred Maintenance Increase — Deferred maintenance funding continues to be an important issue at the DREC. Updates and repairs to facilities that enhance worker safety and productivity are needed. The DREC, specifically, has maintenance issues with the main public use and cattle working facility at the ranch. The facility needs major roof repair and 1,800 square feet of additional cattle working space.

Increased state operating costs due to state fleet rate/policy change.

The Center would be appreciative of enhancing funding that supports the efforts of SBARE through the North Dakota Agricultural Experiment Station and NDSU.

2013-2015 IMPACTS

- Continued work in agronomic, beef and range agricultural practices and developed managerial options reported in the Center's annual report (www.ag.ndsu.edu/DickinsonREC/)
- The Center has prepared to embrace change and the rapid expansion of the energy related business in western ND. The Center continues to keep open channels of communication between agriculture and the energy industry.
- The Center has shifted to explore new forage and cattle resources and inputs that shifts from a grain-based beef production model to a grass-based beef production model.
- Studied various management techniques involving grass cultivars, soil mineral nitrogen, prairie ecosystems, grassland restoration, grazing systems with the integration of beef cattle.
- Investigated conventional and organic agronomic systems, tillage systems, cropping systems, pest control systems, variety development, cover crops and the integration of beef cattle.

Oil well site shot from the road leading into DREC ranch headquarters with headquarters in the foreground.

Agency Overview

Hettinger Research Extension Center

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The HREC is a semi-arid site located in southwest North Dakota, providing the most southerly NDSU location in the non-glaciated portion of North Dakota as a site for its agronomy research program. The HREC also is located at the center of the North Dakota sheep industry, the focus of one of its animal research programs, and in an area of livestock feeding ventures, another focus of animal research at the HREC. Additionally, the HREC is located in a region where much of the land base is in the Conservation Reserve Program, which has resulted in additional research evaluating potential changes in the CRP program and how these changes may affect upland native and game bird populations. A new research program evaluating wildlife/livestock interactions has resulted in a significant increase in the quantity of rangeland research conducted at the HREC throughout the western Dakotas. Research at HREC involves the disciplines of animal science, range science, wildlife science, agronomy, and weed science. Collaboration is with Main Station scientists, Branch Station scientists, U.S. Forest Service, grazing associations, university scientists from WY, SD, and MT, and USDA research entities in these research disciplines to improve productivity of livestock, grazing, and cropping systems, and to improve economic development of the region.

Agency Mission Statement

The Hettinger Research Extension Center, an outreach of North Dakota State University, provides applied research and education in agriculture and environmental sciences that will enrich the lives of North Dakotans and support economic development.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

Extension and Research staffing, both professionals and technical support, for livestock production continue to be a priority to meet the educational and research needs of producers in SW North Dakota. A Livestock Extension Specialist and Research Technician are both needed to meet the livestock needs in SW ND.

A modern livestock processing and research support facility is needed to conduct the research by our sheep and cattle research programs. The current facility is a 16' x 32' lean-to, with no ability to utilize todays modern technology, such as web access, in our research program.

A Sheep Feed Efficiency Research Facility for the evaluation of feed efficiency is needed for the sheep producers of ND to remain competitive. The ND Lamb and Wool Producers Association continues to support such a facility at the Hettinger REC.

Housing of the graduate students and technicians needed for a nationally competitive program continues to be a struggle in western ND. Permanent housing, in a bunkhouse format, is needed to ensure the HREC program can continue to recruit these valuable members of our team on an annual basis.

Deferred maintenance and safety issues will likely reach $1,000,000 by the end of the current biennium. Specifically, due to a continued wet cycle and heavier than normal traffic, the road to the office is unstable and needs to be replaced. Additionally, a frontage road is needed to remove the daily use of Highway 12 by our feed-wagon and tractor, which is on the road 8 to 12 times daily during peak usage. Additional needs include mechanical system renovation of the 1992 office, parking lot re-paving, and roofing and carpeting in the current bunkhouse.

Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- Distributed foundation seed produced at NDSU research centers to southwest North Dakota producers.
- Conducted crop trials and pesticide trials on site as well as at off-station locations.
- Evaluated new varieties and technologies to grow drought tolerant crops, wheat stem sawfly resistance, and new and emerging bio-fuels.
- Conducted multiple land use research evaluating sharp-tailed grouse habitat, cattle grazing systems to complement pheasant habitat concerns, and reclamation of low-quality farmland in the badlands.
- Collaborated with Sitting Bull College on the Standing Rock Sioux Reservation, USDA-ARS, NDSU, and SDSU on a multi-agency project evaluating the reclamation of lands degraded by prairie dogs.
- Conducted a nationally recognized sheep research program evaluating alternative technologies for increasing reproductive efficiency in both males and females, and feedlot research evaluating alternative feeds for lamb finishing.
- Provided producer outreach for all disciplines utilizing conventional field days, web-based programming, and classical written reports.

Center staff collaborated with Sitting Bull College on the Standing Rock Sioux Reservation, USDA-ARS, NDSU, and SDSU on a multi-agency project evaluating the reclamation of lands degraded by prairie dogs.

Agency Overview

Langdon Research Extension Center

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The Langdon Research Extension Center (LREC) is located one mile east of Langdon on US highway five. The agricultural land base at the station consists of 389 owned acres and an additional 320 acres under lease agreement. The LREC serves a nine-county region located in northeast North Dakota and has North Dakota's highest precipitation rates, coolest temperatures, and richest productive soils. The climate creates high levels of diverse crop production and recurring disease problems.

The LREC has a strong tradition of assisting the region's producers to meet agricultural production challenges throughout the course of its existence. In 1993, the LREC redirected much of its research programming to focus on the significant increase of disease and insect pressure associated with its climate. This redirected applied research programming has provided producers with proven cultural practices and advances in chemical applications that minimize disease and insect pressures in all regions of North Dakota.

Since 2001, the LREC has significantly enhanced its overall agricultural research programming with the addition of a crop protection scientist, a director that also serves the region with an emphasis in rural economic/community development, increased foundation seed stocks program and a farm business management instructor. In addition, a full service agricultural based learning center was constructed in 2004 that greatly enhances outreach and extension efforts delivered to the regions agricultural industry.

To complement the research programming at Langdon and to increase extension outreach, two new extension area specialists with programming in agronomy and soil health have been hired since 2013. Finally, additional programming has been created that fosters community vitality in NE ND.

Agency Mission Statement

The Langdon Research Extension Center will conduct applied agricultural research that enhances the quality of life for the regions citizens with a responsive, flexible and accessible overall agricultural based research program. This programming will combine the concepts of agricultural research, information technology and community/economic development while conserving the regions natural resources.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

The Langdon REC conducts all of its research and extension programming on 740 acres of crop land. Of this, 390 acres is owned and 350 acres is leased. Langdon has been leasing a 160 acre quarter section of land to be able to conduct research programming for over 30 years. Recently the landowner of this quarter section of land experienced failing health and is preparing to sell the land. The landowner is allowing the state of North Dakota first chance to purchase the land for the Langdon REC's agricultural research programming. Purchasing the land for Langdon's research will provide a solid land base in the future to continue serving the agricultural industry in North Dakota. Losing this land will force Langdon to cut its research programming effort.

In 1962, a seed cleaning plant was constructed at Langdon to provide local seeds men and producers the ability to purchase and grow the highest quality seed available (foundation grade seed). The regions seeds men and producers have come to depend on this program to supply them with foundation grade seed. Langdon still uses the same facility and equipment that was constructed in 1962. The inefficiencies associated with the plant forces Langdon's seed cleaners to run individual lots of dirty seed through the plant two to five times to achieve foundation grade seed. Because of this and the ability to only clean 20 to 30 bushels of seed per hour, Langdon does not complete its seed cleaning operation until the start of the growing season beyond the prime time for producers to acquire seed. In addition, numerous safety violations have been identified that can only be resolved with a new seed cleaning plant.

The cost of research equipment is extremely high and getting higher year after year due to the fact there are only a few companies that manufacture this specialized equipment. Three years ago a research plot combine cost approximately $170,000 and that same combine today is $250,000 to $300,000. Repair parts for Langdon's older research equipment is either very hard to find or is not being manufactured anymore. An increase in equipment funding would help to keep equipment up to date and manageable.

Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- • Completed construction on a groundwater management project that includes field tiling on 25 acres devoted to applied research and extension demonstrations that will educate growers on the costs, impacts and potential return on investments concerning field tiling.
- The region served by the Langdon REC experiences the highest production of HRSW statewide and Langdon's foundation seed stocks program supplies foundation NDSU HRSW varieties that eventually accounts for 50 percent of all HRSW acreage in NE ND.
- The Langdon REC's cooperation and support of NDAWN's disease forecasting models is assisting growers made better decisions regarding disease control and return on investment in an area that is ground zero for disease pressure on all crops.
- Continued to build strong research partnerships with agricultural input companies, commodity groups, regional crop improvement associations, growers and others to provide unbiased information regarding best management practices for crops grown in our region.
- Produced the highest quality foundation grade seed of the major crops grown in our region.
- Pursued value-added agricultural opportunities that may lead to new high value cropping system opportunities for producers and economic enhancement for rural communities.
- Provided dependable support for main station crop breeding programs and other cropping system research programs based at the main station in Fargo at NDSU.
- Continue to foster and strengthen two new Extension outreach programs in agronomy and soil health that fills a vital educational need for growers in our region.
- Enhanced traditional cropping systems research programs such as contract variety testing to provide dependable data for growers in our region.
- A new agronomy lab is providing dedicated space for more efficient processing and testing of research projects which will allow faster information distribution and less costs.

Center staff provided dependable support for main station crop breeding programs and other cropping system research programs based at the main station in Fargo at NDSU.

Agency Overview

North Central Research Extension Center – Minot

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The NCREC was established in 1945 and is located one mile south of Minot on Highway 83. The 1,200-acre center specializes in crop research and extension education activities and foundation seed production. Approximately 1,500 owned, rented, and contracted acres are planted for foundation seed production each year. The NCREC evaluates conventional and new crops for production in the region and explores weed management and cropping systems to improve the economic potential of crop production in the north central region. The NCREC is a leader in North Dakota on production and disease research of canola, pea, lentil, and chickpea crops, in addition to the conventional crops of hard red spring and durum wheat, barley, flax, sunflower, and oats. The NCREC works closely with business and economic development leaders in the region to improve the economic vitality of north central North Dakota.

Agency Mission Statement

The North Central Research Extension Center conducts research to increase agricultural productivity in north central North Dakota. The center serves agricultural producers in a 12- county region surrounding Minot through crop research, foundation seed production and dissemination, and extension education programs in crop and livestock production. Studies at the center focus on crop variety and new germplasm evaluation, weed control, cropping systems, crop pest management, reduced tillage, and soil fertility. Research is conducted on cereal grains, oilseeds, legumes, forages, and new specialty crops.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

- A mobile seed conditioning mill adequate to handle peas, lentils, beans, and chickpeas (in addition to small grains and oilseeds) for the expanding pulse industry and NDSU breeding program is needed.
- Base funding for personnel to address the research and extension needs for pulse crops, canola, and cereal grains to meet the needs of growers and the increase of processing plants in the Minot area.
- Technical support
- Increased operational costs
- Equipment replacement
- Removal of old seedhouse
- Tile drain yard
- Encroachment from city of Minot/re-location of center (land and facilities)
- Horticulturist needed to serve growing urban population and projects
- Affordable housing/competitive salaries
- Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- Produced, conditioned, and distributed foundation seed of 14 varieties of seven crops grown in the region.
- Screened and assisted in development of alternative/new crops – carinata, winter canola, energy beets.
- Improved fertilizer efficiency in wheat, corn, soybean, and canola.
- Improved production efficiencies in durum wheat, corn seed placement, row spacing and plant population.
- Reclaiming/re-establishing flooded pastures, reclaiming wet/saline farmland with cover crops.
- Researched new crop protection products for eight minor crops grown in ND.
- Researched new products for controlling noxious weeds in non-cropland areas.
- Conducted residue trials with the USDA IR-4 that leads to registration of new pesticides for controlling weeds, diseases, and insects in minor crops.
- Conducted studies in several crops to identify weed control alternatives in response to development of weed resistance.

One of the impacts included improved fertilizer efficiency in wheat, corn, soybean, and canola.

Agency Overview

Williston Research Extension Center

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1

Agency Description

The Williston Research Extension Center, established in 1907 and relocated to the present site in 1954, is an 800-acre rain-fed farm located in northwest North Dakota near the city of Williston. In 2001, an additional 160 acres were purchased in the Nesson Valley 23 miles northeast of Williston and an irrigated research and development project was established. WREC research studies are conducted on crop variety evaluation, herbicide performance and other cultural management research, cropping systems and soil and water conservation practices. The dryland crops include spring wheat, durum. barley, oats, safflower, pea, lentil, chickpea, canola, flax, alfalfa, safflower, forage crops.

WREC research objectives are to increase the producer's net profit, support crop diversification and encourage more intensive cropping and irrigation development. Research on soil and crop management, cropping rotations, systems for sprinkler irrigation, on alternative irrigated high value and value-added crops and on western malting barley programs are conducted. WREC also conducts variety development research on all irrigated and dryland crops in cooperation with NDSU Main Station scientists and other university, USDA-ARS, and private company plant breeders. WREC produces and supplies foundation seed to area farmers of new and superior crop varieties adapted to the region, and has a horticultural research and demonstration program to provide the public with current research based information on gardening, lawn care, trees, shrubs, flowers, fruits, grapes, and many other horticultural topics.

Agency Mission Statement

The Williston Research Extension Center conducts research to increase agricultural productivity in the semi-arid region for northwestern North Dakota while achieving a necessary balance between profitability and conservation of natural resources.

Research on soil and crop management systems for sprinkler irrigation and alternative irrigated high-value/value-added crop production at the Nesson Valley site are conducted in cooperation with the Montana State University Eastern Agricultural Research Center, the USDA-ARS Northern Plains Agricultural Research Laboratory in Sidney, Montana and NDSU and University of Minnesota scientists.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19 the State Board of Agricultural Research and Extension (SBARE) presents a status report to the budget section of the legislative council. SBARE's most recent presentation to the budget section was on March 12, 2014. The report they gave and provided in written form included the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the legislative council office.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agency Future Critical Issues

Pea and lentil acreage has dramatically increased over the past 15 years and there has also been a significant increase in production of other broadleaf alternative crops. The switch from a strict 2 year small grain fallow rotation to a more intensive and diversified cropping system has resulted in a reduction of over one million summer fallow acres in northwest North Dakota and as a result, increased return on these acres by over 200 million dollars annually.

Farmers in the MonDak region are now growing more than 20 different crops. There is an urgent need for additional technical support for WREC and off-station variety testing in all of these crops in dryland and irrigated cropping systems. There is a critical need for a plant pathologist to evaluate and research crop disease impacts due to the result from wheat-fallow to continuous no till farming, and more intensive cropping systems in western North Dakota.

A modern horizontal seed conditioning mill with color sorter is needed at WREC to replace the 5 floor seed conditioning plant built in 1954 to address worker safety concerns and allow gentle handling of field peas, soybeans, and other fragile crops. Updated seed cleaning equipment with new color sorting technology will dramatically improve seed cleaning efficiencies and assures high purity of foundation seed crop varieties to North Dakota certified seed growers.

Retention and recruitment of staff is our most critical issue for WREC due to the huge impact of oil and gas development in the Williston area. The energy explosion has significantly increased competitive wages, over the cost of living and created a severe housing shortage and housing costs in the region.

The Williston area is the fastest growing micropolition community in the nation with a projected increase of 160,000 people in over a four county area. WREC Horticulture research and outreach is becoming increasingly more important to address clientele requests for advice in landscaping, gardening, lawns, vineyards, adapted plant species, pest management, and food preparations. A greenhouse is needed for the WREC Horticulture Program to enhance the ability to conduct horticultural research and outreach activities during the winter months and assist with acclimation of plants moving outdoors.

Increased state operating costs due to state fleet rate/policy change.

2013-2015 IMPACTS

- Initiated a long term dryland cropping sequence project to evaluate and develop diversified cropping systems recommendations for improving crop performance, precipitation use, soil health, and economic sustainability.
- Evaluated the performance and adaptation of experimental dryland crop cultivators to identify new and superior crop varieties. Newly released NDSU varieties for our region include Joppa durum, Carpio durum, and Gold ND flax.
- The Nesson Valley Irrigation and Development Project (NVIRDP) in its ninth year is identifying irrigated crop production products that impact production input efficiency and identify sustainable and efficient soil and water management strategies. Studies included variable rate irrigation strategies, water use, tillage systems, cropping systems, soil health, and pest management.
- The NVIRDP continues to evaluate high value crops, row crops, small grains, oilseeds, bioenergy beets, biomass forages, and other crops in an irrigated environment to identify superior crops and crop varieties to enhance crop diversity for irrigated producers.
- WREC Horticulture research is conducted on potatoes, onions, sweet potatoes, tomatoes, hops, grape vineyards, shade trees, shelterbelts, and apple orchards. Demonstrations and workshops included landscaping, home garden trials, daylily collection garden, All American Vegetables, Flowers, and Herbs demonstration garden, northern grape project, small fruit production trials, shade trees, shelterbelts, and master gardening.
- The WREC Ag Diversification Extension Specialist meets with and provides economic crop comparisons, crop acre tables, and irrigation maps of the MonDak region to ag processors considering locating in our region and helps organize and facilities outreach, workshops, tours, field days, pest schools, county agent updates, and other outreach activities

The Williston Research Extension Center had developed and utilize a 160-acre irrigated site in the Nesson Valley for developing improved irrigated cropping systems and best management products to improve water use, soil health, crop management systems, and economic sustainability.

NDAES
Agronomy Seed Farm

Agronomy Seed Farm

North Dakota Agricultural Experiment Station

Agency Statutory Authority

North Dakota Century Code Chapter 4-05.1.

Agency Description

The Agronomy Seed Farm (ASF) is a 590 acre farm located near Casselton, which has been a part of the North Dakota Agriculture Experiment Station (NDAES) since it was gifted to the state in 1950. It was the result of a fund drive conducted by the North Dakota Crop Improvement Association, which solicited farmers, seed companies and many others throughout the state to help establish a farm whose main purpose is to increase seed of new varieties as they are developed by the plant breeding and supporting departments of the NDAES. The ASF also propagates seed of older but still desirable varieties for the seedsmen of the area.

Agency Mission Statement

To produce an adequate supply of Foundation grade seed for the seedsmen of the state and area at a reasonable price and to support the varietal development research of the NDAES.

Agency Performance Measures

Per North Dakota Century Code 4-05.1-19, the State Board of Agricultural Research and Extension (SBARE) presents a status report to the Budget Section of the Legislative Council. SBARE's most recent presentation to the Budget Section was on March 12, 2014. The report provided the status of the North Dakota Agricultural Experiment Station and the NDSU Extension Service. A copy of the information is on file in the Legislative Council office.

Agency Future Critical Issues

The critical issues facing the ASF are a continued demand for Foundation grade seed, favorable weather for growing seed and a good supply of varieties that are in demand by the seed industry. If these three conditions are present and good commodity prices accompany them, the future of the ASF is secure.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Agronomy Seed Farm

2013-2015 IMPACTS

- Produced 25,000 to 50,000 bushels of seed for availability to the seed industry annually.
- Conditioned 35,000 to 50,000 bushels of seed for availability to the seed industry annually.

The Agronomy Seed Farm's mission is to produce an adequate supply of Foundation grade seed for the seedsmen of the state and area at a reasonable price and to support the varietal development research of the NDAES.

NDSU EXTENSION SERVICE

2015-17 One-time Request and Additional Request as Supported by SBARE

One-time Request: Oil Patch Salary Differential Pool

One-time funds are requested to provide salary support to aid in the retention and recruitment of Extension employees in the heaviest-impacted oil counties. These Extension educators are essential for the NDSU Extension Service to fulfill our mission to serve North Dakotans in this region. Data from the Job Service ND documents that the average salaries in the targeted eight counties were 50% greater than the state average as a result of oil industry market competition. As a result, our efforts to recruit employees into these counties and retain employees who live and work in these counties is a major challenge because of market competition and housing costs. - $250,000

Additional Request

Funding to provide technical assistance grants to soil conservation districts to help landowners reduce soil erosion, improve water quality, and enhance tree plantings, grazing lands and wildlife habitat - $75,000

DETAILS:
2015-2017 One-time Request and Additional Request as Ranked by SBARE

NDSU Extension Service

One-time Request: Oil Patch Salary Differential Pool $250,000

One-time funds will be used to provide salary support to aid in the retention and recruitment of critical Extension employees in oil-impacted counties facing the pressure of high market competition and high housing costs.

One-time funds will be used to provide full- and part-time permanent NDSU Extension Service employees with less than 10 years of Extension employment with an FTE pro-rated $500/month salary differential payment. The NDSU Extension Service serves agriculture, families and communities through agents serving each county in the state and the Fort Berthold Reservation. Extension area specialists provide program leadership from the Dickinson, North Central and Williston Research Extension Centers. These Extension educators are the essential element for the NDSU Extension Service to fulfill our mission. These targeted Extension employees in the oil patch counties include county-based agents, specialists and office support staff (18 employees, 16.4 FTE). In addition to the proposed salary differential payment, a 10% additional expense is budgeted for payroll tax and deductions. These one-time funds will be used for temporary salary differential payments for this biennium and will not be added to base salaries.

All of the targeted NDSU employees work in seven of the heaviest impacted oil producing counties (Burke, Divide, Dunn, McKenzie, Mountrail, Stark and Williams counties as based on oil drilling, wells and production; source ND Industrial Commission) and Ward County which serves as a major oil industry service hub.

The 2012 Quarterly Census of Employment and Wages from Job Service ND documents that the average salaries in these eight counties are 50.0% greater than the state average as a result of oil industry market competition. As a result, our efforts to recruit employees into these counties and retain employees who live and work in these counties is a major challenge because of market competition and housing costs. We currently have six vacancies in this region. Because of recruitment, retention and housing cost challenges, we have proposed a $500/month salary payment, which is modeled on the $484 and $500/month payments of ND Department of Transportation and ND Highway Patrol, respectively. This payment will provide a 12% average salary increase for these newest and least-established Extension employees. While this modest amount will not rectify salary disparities or shortfalls in the rental market, we believe it will boost morale and help to achieve our objective and acknowledge the additional stress faced by employees serving in these counties. These funds are requested because our state authorized funds are fully committed. The State Board of Agricultural Research and Education (SBARE) has state-wide responsibility for assessing Extension needs and they have identified the importance of retaining and recruiting staff in oil-impacted regions in order for Extension to serve ND clientele.

Additional Request - North Dakota State Soil Conservation Committee $75,000

For increased technical and administrative support for the Soil Conservation District Assistance Program to assist landowners with conservation practices. The planning, design, installation and checkout of conservation practices by participating soil conservation districts have a significant impact on North Dakota's natural resources. Funds from this request will assist soil conservation districts to help landowners reduce soil erosion, improve water quality, and enhance tree plantings, grazing lands and wildlife habitat.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2015-17 Capital Improvement and One-time Requests as Ranked by SBARE

1. Veterinary Diagnostic Lab - Main Station

The NDAES Veterinary Diagnostic Lab (VDL) may lose accreditation because it does not meet modern laboratory standards. Loss of accreditation would affect North Dakota veterinarians and livestock producers relying on the facility for test results; would result in significantly higher costs for animal health and regulatory testing for North Dakota livestock producers, veterinarians, and the public. The state would be unable to respond to animal health emergencies in a timely fashion.

A new and modern facility to house the veterinary diagnostic laboratory (VDL) at North Dakota State University should be a minimum of 20,000 square feet (current facility is approximately 8,000 square feet) and be designed to allow cost effective addition of laboratory space, as needed, to meet future testing demands. - $18,000,000

(see attached conceptual plan and estimate provided by EAPC Architects)

2. Meats Lab Facility – Main Station

A new/upgraded facility urgently needed. The current Meats Lab is approximately 7,500 sq. ft. and was built in the 1950's and no longer serves the needs of modern meat science research. Annual repair and maintenance costs to the current facility continue to increase. Additionally, the Lab continues to struggle to meet the U.S. Department of Agriculture inspection requirements for safe meat handling and processing. A new facility is necessary because opportunities to grow the state's livestock industries are tied to the knowledge of the end product and how that product meets the needs of national and international consumers. Design features of a 19,000 sq. ft. facility would include animal holding and handling areas, an abattoir, processing and fabrication rooms, research labs, walk-in coolers and freezers, sensory evaluation labs, preparation kitchens, conference rooms, and other miscellaneous support, storage, and equipment rooms. - $7,600,000

3. Seed Cleaning Facilities – CREC, LREC, NCREC, WREC

Seed cleaning facilities at CREC, LREC, NCREC, and WREC need to be replaced. Current facilities are antiquated, lack reliable capability to ensure high quality seed, are slow, and inefficient. These facilities were designed to handle cereal crops and have limited/no capability of cleaning pulse crops and other fragile seed that are in high demand. Also, the existing facilities pose considerable worker safety issues. The request is for four portable mills and a storage facility for the mill when not in use. Each Center will have one mill, with appropriate air screen cleaner, indent mill and gravity mill, augers, conveyors, and cyclone dust cleaning system. The capacity would be approximately 300 bu/hr, depending on type of crop being cleaned. The facility will have the appropriate electrical, ventilation, and heating necessary for electric eye separators (at CREC, NCREC, and WREC) to ensure a high quality product. - $5,250,000

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2015-17 Capital Improvement and One-time Requests as Ranked by SBARE

Unranked Capital Request:

Funding of $400,000 was appropriated by the sixty-third Legislative Assembly. Bids received for the project were significantly over budget. The amount requested is an estimate to complete the project as presented. The amount was calculated by the architectural firm that has been contracted for all agronomy lab construction projects that were funded this biennium.

Agronomy Lab CGREC

With the addition of a forage agronomist at the CGREC, the center is in need of a forage lab building. Currently samples collected in the field by the scientist are processed in a corner of an equipment storage building with a dirt floor. The dust from opening the overhead door and moving equipment renders this area very dusty and difficult to keep scales and computers clean. The new building would house the forage drying ovens, computer, scale etc. for sample data processing. It would also house the grinders and equipment to process the forage samples in preparation for nutrient analysis. - $783,796

One-time Requests:

Oil Patch Salary Differential Pool

The oil industry on the infrastructure, salary, and cost of living in western North Dakota is having a wide and lasting impact on the state's western population and the state's workers residing in the area. This will provide salary support to aid in the retention and recruitment of Experiment Station employees at RECs located in oil-impacted counties, which are experiencing the pressure of high market competition and high housing costs. - $430,000

Deferred Maintenance Increase

Deferred maintenance funding continues to be an important issue. Updates and repairs to facilities that enhance worker safety and productivity are needed across the AES. The CGREC, specifically, has maintenance issues with all residences, barns, and office buildings. Similar issues exist at other centers, primarily with respect to facility updates and repairs. - $1,440,465

Main Station Greenhouse

- Increase geothermal well capacity $1,200,000 – funding for the greenhouse construction allowed for a portion of geothermal wells to be installed – the system is working well, but additional well capacity is needed to heat/cool the headhouse building. It is estimated that 200 additional wells will be needed, given the high heating and cooling demand of the facility.
- Utilities $400,000 – underestimated in construction phase. As the BL-3 portion of the facility comes online, utility costs will increase further. This request would provide needed funds and allow data to be collected on usage and costs that will be used for a formal permanent request in 2017.

- $1,600,000

www.eapc.net
EAPC
Architecture | Engineering | Industrial | Wind Energy | Interior Design
112 North Roberts Street, Suite 300 | TELE 701.461.7222 | FAX 701.461.7223

NDSU Veterinary Diagnostic Laboratory

Schematic Design 6/27/2014 (rev 8/01/14)

		Unit	Price/Unit	Total
NDSU Veterinary Diagnostic Laboratory				
A.	SITEWORK/UTILITIES/PARKING			$ 1,018,935
B.	BUILDING CONSTRUCTION			$ 12,431,007
	CONSTRUCTION SUBTOTAL			$ 13,449,942
	FURNITURE, FINISHES & EQUIPMENT			$ 1,000,000
	CONSTRUCTION TOTAL			$ 14,449,942
	CONTINGENCY 10%			$ 1,344,994
	A/E PROFESSIONAL FEES 7%			$ 1,035,646
	REIMBURSABLE EXPENSES			$ 25,000
	SITE SURVEY			$ 8,000
	SOIL BORINGS			$ 15,000
	CONSULTANT EXPENSES/TRAVEL			$ 25,000
	PROJECT TOTAL			$ 17,903,582

Building Concept

CONCEPTUAL BUILDING PLAN

EAPC ARCHITECTS ENGINEERS
112 North Roberts Street, Suite 300
Fargo, North Dakota 58102
P 701.461.7222 F 701.461.7223
www.eapc.net

VETERINARY DIAGNOSTICS LAB
NORTH DAKOTA STATE UNIVERSITY
FARGO, NORTH DAKOTA

Sheet A1
Date Conceptual Building Plan
EAPC Project Number 20142020
NORTH
10 30 50 75 100

DETAILS:
2015-2017 Capital Improvement Projects
as Ranked by SBARE

ND Agricultural Experiment Station

1. Veterinary Diagnostic Lab $18,000,000

The NDAES Veterinary Diagnostic Lab (VDL) may lose accreditation because it does not meet modern laboratory standards. Loss of accreditation would affect North Dakota veterinarians and livestock producers relying on the facility for test results; would affect affiliation with the National Animal Health Laboratory Network (subsequently affecting funds for diagnostic equipment, proficiency testing for regulatory diseases, partial salary support for an IT position, and would prevent competition for surveillance testing contracts); would restrict access to Federal funds for bioterrorism preparedness and partial funding of technical support; inhibits the ability to conduct regulatory testing for animals crossing state and international borders; restricts surveillance of diseases of human health significance, such as rabies, anthrax, and West Nile virus; affects the ability of the VDL to participate in the Veterinary Laboratory Response network for toxicology testing. Veterinary clinics often require the use of an accredited veterinary diagnostic lab for biopsies and bacterial culture. The loss of accreditation would result in significantly higher costs for animal health and regulatory testing for North Dakota livestock producers, veterinarians, and the public. The state would be unable to respond to animal health emergencies in a timely fashion.

A new and modern facility to house the veterinary diagnostic laboratory (VDL) at North Dakota State University should be a minimum of 20,000 square feet (current facility is approximately 8,000 square feet) and be designed to allow cost effective addition of laboratory space, as needed, to meet future testing demands (i.e. meat testing, analysis of feed and animal samples for petroleum residues, international export testing). The facility should include adequate laboratory and office space for sample receiving, toxicology, serology, information technology, administration, clinical pathology, gross pathology, histology, quality assurance, bacteriology/mycology, virology and molecular diagnostic sections. In addition, space to house a library and conference/meeting room that can accommodate presentations for producer groups, veterinary groups and student groups should be included. Since the future of carcass rendering is uncertain, it is necessary to install a tissue digester to ensure safe and adequate carcass disposal capacity. A new VDL needs to have dedicated Biosafety Level 3 necropsy/laboratory space (including the ability to capture effluent) to safely address current and future public health threats and potential introductions of foreign animal diseases. This facility should have a biosecure visitor's entry with dedicated bathrooms. Adequate parking space, semi-truck and trailer access and a radiology room are needed. An enclosed receiving area that will allow for off-loading of animal carcasses, as well as live animals that may require euthanasia, is required. Appropriate storage for archiving records and data storage is necessary. Adequate freezer space for individual labs and lockup of samples involved in litigation cases is important. The post mortem laboratory should have access points that allow shower-in/shower-out capability for personnel as well biosecure entry and exit points to safely contain animal and human pathogens. The entire building must be sufficiently secure with electronic card key access to individual laboratories. An alarm system including monitoring of major equipment, and a back-up power source are necessary as well. Building surveillance cameras are suggested.

2. Meats Lab Facility $7,600,000

Main Station – A new/upgraded facility urgently needed. The current Meats Lab is approximately 7,500 sq. ft. and was built in the 1950's and no longer serves the needs of modern meat science research. Annual repair and maintenance costs to the current facility continue to increase. Additionally, the Lab continues to struggle to meet the U.S. Department of Agriculture inspection requirements for safe meat handling and processing. A new facility is necessary because opportunities to grow the state's livestock industries are tied to the knowledge of the end product and how that product meets the needs of national and international consumers. Design features of a 19,000 sq. ft. facility would include animal holding and handling areas, an abattoir, processing and fabrication rooms, research labs, walk-in coolers and freezers, sensory evaluation labs, preparation kitchens, conference rooms, and other miscellaneous support, storage, and equipment rooms.

3. Seed Cleaning Facilities $5,250,000

Seed cleaning facilities at CREC, LREC, NCREC, and WREC need to be replaced. Current facilities are antiquated, lack reliable capability to ensure high quality seed, are slow, and inefficient. These facilities were designed to handle cereal crops and have limited/no capability of cleaning pulse crops and other fragile seed that are in high demand. Also, the existing facilities pose considerable worker safety issues. The request is for four portable mills and a storage facility for the mill when not in use. Each Center will have one mill, with appropriate air screen cleaner, indent mill and gravity mill, augers, conveyors, and cyclone dust cleaning system. The capacity would be approximately 300 bu/hr, depending on type of crop being cleaned. The facility will have the appropriate electrical, ventilation, and heating necessary for electric eye separators (at CREC, NCREC, and WREC) to ensure a high quality product.

NDSU Agricultural Experiment Station
Agronomy Laboratories

UNRANKED 2015-17 CAPITAL REQUESTS

Central Grasslands Agronomy Lab

- Funding of $400,000 received in 13-15 session. Bids received for project were significantly over budget. The amount requested is JLG Architects estimate to complete project as presented.

Agronomy lab CGREC- $783,796

With the addition of a forage agronomist at the CGREC, the center is in need of a forage lab building. Currently samples collected in the field by the scientist are processed in a corner of an equipment storage building with a dirt floor. The dust from opening the overhead door and moving equipment renders this area very dusty and difficult to keep scales and computers clean. The new building would house the forage drying ovens, computer, scale etc. for sample data processing. It would also house the grinders and equipment to process the forage samples in preparation for nutrient analysis.

JLG architects

MEMO

JLG 13079d Central Grasslands Ag Lab
Issued: May 5, 2014
Issued By: Todd R. Medd, AIA, NCARB

Per our coordination meetings regarding the budget for the NDSU Central Grasslands Agronomy Laboratory project in Streeter, North Dakota, NDSU requested that JLG Architects compile a statement of probable cost for the project based on recent bidding results as well as our understanding of escalation of construction costs in North Dakota.
NDSU requested that we compile this estimate based on the original requested program and plan layout that equated to a 2,800 sf building that included lab spaces, drying room, grinding room, staging areas, and required storage (please see attached drawings). Below is a summary of this statement of probable cost, please see attached information as well.

2,800 sf Forage Agronomy Lab Estimate of Probable Cost:

Building and Site Construction Cost Estimate:	$ 952,674.60
Construction Cost Escalation Estimate (5%):	$ 47,633.73
Owner Soft Cost Estimate:	$ 96,977.34
Furnishings, Fixtures and Equipment Estimate:	$ 53,750.00
Total Project Budget:	$ 1,151,035.67

Please note, JLG Architects estimates that construction cost escalation is anticipated to be 4-5% per year; the above estimates were calculated based on 2014 construction costs. Also note that the numbers above exclude project costs paid to date, and JLG Architects recommends that all construction projects maintain a minimum of a 3-5% construction contingency.

One-time Requests:

Oil Patch Salary Differential Pool

The oil industry on the infrastructure, salary, and cost of living in western North Dakota is having a wide and lasting impact on the state's western population and the state's workers residing in the area. This will provide salary support to aid in the retention and recruitment of Experiment Station employees at RECs located in oil-impacted counties, which are experiencing the pressure of high market competition and high housing costs. - $430,000

Deferred Maintenance Increase

Deferred maintenance funding continues to be an important issue. Updates and repairs to facilities that enhance worker safety and productivity are needed across the AES. The CGREC, specifically, has maintenance issues with all residences, barns, and office buildings. Similar issues exist at other centers, primarily with respect to facility updates and repairs. - $1,440,465

Main Station Greenhouse

- Increase geothermal well capacity $1,200,000 – funding for the greenhouse construction allowed for a portion of geothermal wells to be installed – the system is working well, but additional well capacity is needed to heat/cool the headhouse building. It is estimated that 200 additional wells will be needed, given the high heating and cooling demand of the facility.
- Utilities $400,000 – underestimated in construction phase. As the BL-3 portion of the facility comes online, utility costs will increase further. This request would provide needed funds and allow data to be collected on usage and costs that will be used for a formal permanent request in 2017.

  - $1,600,000

Governor's
Recommended Budget

15.8128.01000

Sixty-fourth
Legislative Assembly
of North Dakota

HOUSE BILL NO. 1020

Introduced by

Appropriations Committee

(At the request of the Governor)

A BILL for an Act to provide an appropriation for defraying the expenses of the extension service, northern crops institute, upper great plains transportation institute, main research center, branch research centers, and agronomy seed farm; to provide for a report; to provide for transfers; to provide an exemption; and to declare an emergency.

BE IT ENACTED BY THE LEGISLATIVE ASSEMBLY OF NORTH DAKOTA:

SECTION 1. APPROPRIATION. The funds provided in this section, or so much of the funds as may be necessary, are appropriated out of any moneys in the general fund in the state treasury, not otherwise appropriated, and from special funds derived from federal funds and other income, to the North Dakota state university extension service, the northern crops institute, the upper great plains transportation institute, the main research center, branch research centers, and agronomy seed farm for the purpose of defraying the expenses of the North Dakota state university extension service, the northern crops institute, the upper great plains transportation institute, the main research center, branch research centers, and agronomy seed farm, for the biennium beginning July 1, 2015, and ending June 30, 2017, as follows:

Subdivision 1.

NORTH DAKOTA STATE UNIVERSITY EXTENSION SERVICE

	Base Level	Adjustments or Enhancements	Appropriation
Extension service	$48,867,985	$7,155,968	$56,023,953
Soil conservation committee	1,137,800	0	1,137,800
Accrued leave payments	1,716,289	(1,716,289)	0
Total all funds	$51,722,074	$5,439,679	$57,161,753
Less estimated income	23,897,809	2,422,471	26,320,280

Total general fund	$27,824,265	$3,017,208	$30,841,473
Full-time equivalent positions	262.91	3.00	265.91

Subdivision 2.

NORTHERN CROPS INSTITUTE

	Base Level	Adjustments or Enhancements	Appropriation
Northern crops institute	$3,719,827	$180,659	$3,900,486
Accrued leave payments	42,195	(42,195)	0
Total all funds	$3,762,022	$138,464	$3,900,486
Less estimated income	1,797,161	(43,371)	1,753,790
Total general fund	$1,964,861	$181,835	$2,146,696
Full-time equivalent positions	12.00	0.00	12.00

Subdivision 3.

UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

	Base Level	Adjustments or Enhancements	Appropriation
Upper great plains transportation institute	$25,038,160	($3,285,113)	$21,753,047
Accrued leave payments	241,627	(241,627)	0
Total all funds	$25,279,787	($3,526,740)	$21,753,047
Less estimated income	22,452,963	(4,063,129)	18,389,834
Total general fund	$2,826,824	$536,389	$3,363,213
Full-time equivalent positions	54.98	0.00	54.98

Subdivision 4.

MAIN RESEARCH CENTER

	Base Level	Adjustments or Enhancements	Appropriation
Main research center	$102,691,843	$32,214,210	$134,906,053
Accrued leave payments	2,561,394	(2,561,394)	0
Total all funds	$105,253,237	$29,652,816	$134,906,053

Less estimated income	53,053,716	4,330,349	57,384,065
Total general fund	$52,199,521	$25,322,467	$77,521,988
Full-time equivalent positions	351.85	4.00	355.85

Subdivision 5.

RESEARCH CENTERS

	Base Level	Adjustments or Enhancements	Appropriation
Dickinson research center	$6,116,621	$1,345,697	$7,462,318
Central grasslands research center	3,229,867	489,526	3,719,393
Hettinger research center	4,661,729	642,695	5,304,424
Langdon research center	2,832,495	377,212	3,209,707
North central research center	4,582,677	649,037	5,231,714
Williston research center	3,766,986	1,778,697	5,545,683
Carrington research center	7,892,494	1,795,593	9,688,087
Accrued leave payments	503,916	(503,916)	0
Total all funds	$33,586,785	$6,574,541	$40,161,326
Less estimated income	16,001,083	3,902,864	19,903,947
Total general fund	$17,585,702	$2,671,677	$20,257,379
Full-time equivalent positions	110.94	4.00	114.94

Subdivision 6.

AGRONOMY SEED FARM

	Base Level	Adjustments or Enhancements	Appropriation
Agronomy seed farm	$1,466,018	$67,259	$1,533,277
Accrued leave payments	5,741	(5,741)	0
Total special funds	$1,471,759	$61,518	$1,533,277
Full-time equivalent positions	3.00	0.00	3.00

Subdivision 7.

BILL TOTAL

	Base Level	Adjustments or Enhancements	Appropriation

Grand total general fund	$102,401,173	$31,729,576	$134,130,749
Grand total special funds	118,674,491	6,610,702	125,285,193
Grand total all funds	$221,075,664	$38,340,278	$259,415,942

SECTION 2. ONE TIME FUNDING - EFFECT ON BASE BUDGET - REPORT TO SIXTY-FIFTH LEGISLATIVE ASSEMBLY. The following amounts reflect the one-time funding items approved by the sixty-third legislative assembly for the 2013-15 biennium and the 2015-17 one-time funding items included in the appropriation in section 1 of this Act:

One-Time Funding Description	2013-15	2015-17
Agronomy laboratories	$5,925,000	$783,796
Extension 4-H camp renovation	1,900,000	0
Feed mill equipment	100,000	0
Video conference equipment	110,000	0
Upper great plains transportation institute state match for federal funds	1,250,000	0
Diagnostic equipment	400,000	0
Junior master gardener program	25,000	0
Flooded lands study	82,000	0
Veterinary diagnostic laboratory	0	18,000,000
Greenhouse utilities	0	400,000
Total all funds	$9,792,000	$19,183,796
Total other funds	950,000	0
Total general fund	$8,842,000	$19,183,796

The 2015-17 one-time funding amounts are not a part of the entity's base budget for the 2017-19 biennium. The main research center shall report to the appropriations committees of the sixty-fifth legislative assembly on the use of this one-time funding for the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 3. ADDITIONAL INCOME - APPROPRIATION. In addition to the amount included in the grand total special funds appropriation line item in section 1 of this Act, any other income, including funds from federal acts, private grants, gifts, and donations, or from other sources received by the North Dakota state university extension service, the northern crops institute, the upper great plains transportation institute, the main research center, branch

research centers, and agronomy seed farm, except as otherwise provided by law, is appropriated for the purpose designated in this Act, grant, gift, or donation, for the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 4. DICKINSON RESEARCH EXTENSION CENTER - MINERAL RIGHTS INCOME - REPORT. The Dickinson research extension center may spend up to $755,000 of revenues received during the 2015-17 biennium from mineral royalties, leases, or easements for ongoing operational expenses. Any revenues received in excess of $755,000 may be spent only for one-time expenditures for the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 5. WILLISTON RESEARCH EXTENSION CENTER - MINERAL RIGHTS INCOME - REPORT. The Williston research extension center shall report to the sixty-fifth legislative assembly on amounts received and spent from mineral royalties, leases, or easements in the biennium beginning July 1, 2013, and ending June 30, 2015, and the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 6. TRANSFER AUTHORITY. Upon approval of the state board of agricultural research and education and appropriate branch research center directors, the director of the main research center may transfer appropriation authority within subdivisions 1, 2, 4, and 5 of section 1 of this Act. Any amounts transferred must be reported to the director of the office of management and budget.

SECTION 7. FULL-TIME EQUIVALENT POSITION ADJUSTMENTS. The board of higher education may adjust or increase full-time equivalent positions as needed for the entities in section 1 of this Act, subject to availability of funds. The board shall report any adjustments to the office of management and budget before the submission of the 2017-19 budget request.

SECTION 8. UNEXPENDED GENERAL FUND - EXCESS INCOME - EXEMPTION. Any unexpended general fund appropriation authority to and any excess income received by entities listed in section 1 of this Act are not subject to the provisions of section 54-44.1-11, and any unexpended funds from these appropriations or revenues are available and may be expended by those entities, during the biennium beginning July 1, 2017, and ending June 30, 2019.

SECTION 9. EXEMPTION. The amounts appropriated for the agronomy laboratories contained in subdivision 4 of section 1 of chapter 51 of the 2013 Session Laws, are not subject to the provisions of section 54-44.1-11, and any unexpended funds from these appropriations or

related revenues are available and may be expended during the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 10. EXEMPTION. The amounts appropriated for the Extension 4-H camp contained in subdivision 1 of section 1 of chapter 51 of the 2013 Session Laws are not subject to the provision of section 54-44.1-11, and any unexpended funds from these appropriations or related revenues are available and may be expended during the biennium beginning July 1, 2015, and ending June 30, 2017.

SECTION 11. EMERCENGY. The appropriation for capital projects of $18,783,796 in subdivision 4 of section 1 of this Act is declared to be an emergency measure.

Financial Schedules

2015-17 Budget Request comparison - NDSU Extension Service

	2015-17 SBARE Priority List	Included in 2015-17 Executive Recommendation
NDSU Extension Service		
Cost to continue 2014-15 salary & retirement increase	$0	$272,281
Compensation package (4% per year) and health insurance & retirement increases	$0	$1,924,927
SBARE #1: Agricultural Programs and Capacity	$1,285,000	$240,000
Area livestock Extension Specialist (HREC)-1.0 FTE	$200,000	$200,000
Operating	$80,000	$40,000
Extension precision agriculture economist-1.0 FTE	$230,000	$0
Operating	$80,000	$0
Extension infrastructure operating support	$320,000	$0
Extension fellows-3.75 FTE	$375,000	$0
SBARE #2: Community Vitality	$780,000	$240,000
Area community vitality specialists-3.0 FTE **[Recommended 1.0 FTE]**	$600,000	$200,000
Operating	$180,000	$40,000
SBARE #3: Food Systems and Health	$720,000	$340,000
Area food and health specialists-2.0 FTE **[Recommended 1.0 FTE]**	$400,000	$200,000
Operating	$120,000	$40,000
Salary pool to increase local county programming	$200,000	$100,000
SBARE #4: Water Resources	$310,000	$0
Extension water specialist-1.0 FTE	$230,000	$0
Operating	$80,000	$0
SBARE Additional Request: Soil Conservation Committee Technical Assistance Grants	$75,000	$0
Total base increase - NDSU Extension Service	**$3,170,000**	**$3,017,208**
ONE-TIME FUNDING		
Oil patch salary differential pool	$250,000	$0
Total one-time funding- NDSU Extension Service	**$250,000**	**$0**

2015-17 Budget Request comparison - North Dakota Agricultural Experiment Station

	2015-17 SBARE Priority List	Included in 2015-17 Executive Recommendation
North Dakota Agricultural Experiment Station		
Cost to continue 2014-15 salary & retirement increase	$0	$741,779
Compensation package (4% per year) and health insurance & retirement increases	$0	$4,831,569
	$0	$0
	$0	$0
SBARE #1: Bioinformatics	$1,200,000	$800,000
3.0 FTE bioinformaticist (Main Station) **[Recommended 2.0 FTE]**		
SBARE #2: Precision Ag	$2,910,000	$455,000
2.0 FTE scientist and technical support staff (Main Station)	$355,000	$355,000
Operating	$2,555,000	$100,000
SBARE #3: Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness	$1,900,000	$1,100,000
Graduate student funding	$800,000	$0
Revolving Equipment Fund (REF) increase and make annual-not revolving	$1,100,000	$1,100,000
SBARE #4: Risk and Trade	$420,000	$0
Center for Ag Policy & Trade Studies (CAPTS)-1.0 FTE research scientist (Main Station)	$160,000	$0
Risk Management-1.0 FTE support staff (Main Station)	$160,000	$0
Operating	$100,000	$0
SBARE #5: Enhancing Research Capacity at the RECs	$1,270,000	$800,000
Animal science technical support staff- 1.0 FTE (HREC)	$130,000	$130,000
Dust issues in western ND- 1.0 FTE technical support staff (DREC)	$130,000	$130,000
Livestock Productivity and Protection-2.0 FTE technical support (CREC & DREC)	$260,000	$0
Plant Pathologist for Western ND-2.0 FTE scientist and technical support (WREC)	$330,000	$330,000
Operating **[Recommended $30,000 for each REC]**	$420,000	$210,000
SBARE #6: Genetics and Genomics Initiative	$1,305,000	$0
Epigenetics-2.0 FTE scientist and technician (Main Station)	$355,000	$0
Statistical genomics-2.0 FTE scientist and support staff (Main Station)	$355,000	$0
Metagenomics-2.0 FTE scientist and technical support staff (Main Station)	$355,000	$0
Operating	$240,000	$0
SBARE #7: Livestock Research to Enhance Productivity and Profitability	$710,000	$0
Microbiome Initiative-2.0 FTE scientist and technical support (Main Station)	$355,000	$0
Forage Nutrition-2.0 FTE scientist and technical support (Main Station)	$355,000	$0
SBARE #8: Food Safety/Global Institute for Food Security and Int'l Agriculture	$500,000	$0
Operating Support		
SBARE #9: Soil Health Research Support	$150,000	$0
Increased operating to build upon the Soil Health Initiative supported in the 2011-13 Legislative Session)		
Total base increase - North Dakota Agricultural Experiment Station	**$10,365,000**	**$8,728,348**

ONE-TIME & CAPITAL FUNDING

Oil patch salary differential pool	$430,000	$0
Deferred maintenance	$1,440,465	$0
Main station greenhouse utilities	$400,000	$400,000
Main station greenhouse geothermal well capacity	$1,200,000	$0
SBARE #1 Capital: Veterinary Diagnostic Lab Replacement	$18,000,000	$18,000,000
SBARE #2 Capital: Meats Lab Facility (Main Station)	$7,600,000	$0
SBARE #3 Capital: Seed Cleaning Facilities (CREC, LREC, NCREC, WREC)	$5,250,000	$0
Unranked Capital: Completion of lab at CGREC	$783,796	$783,796
Total One-time & capital funding-North Dakota Agricultural Experiment Station	**$35,104,261**	**$19,183,796**

Extension Service and Main & Branch Research Centers
Reconciliation of 2013-15 Original General Fund Appropriation to 2015-17 Executive Recommendation (HB 1020)

	(1) Extension Service	(2) Main Research Center	(3) Branch Research Centers	(4) Total
2013-15 Original General Fund Appropriation	**$ 28,909,265**	**$ 58,606,521**	**$ 17,585,702**	**$ 105,101,488**
Funds from Energy Development Impact Funding Pool	10,500		14,500	25,000
2013-15 Adjusted GF Appropriation	**28,919,765**	**58,606,521**	**17,600,202**	**105,126,488**
Base Adjustments:				
Less funds from Energy Development Impact Funding Pool	(10,500)		(14,500)	(25,000)
Less 2013-15 One-time Appropriations	(135,000)	(400,000)		(535,000)
Less 2013-15 Capital Projects, net of emergency clause	(950,000)	(5,925,000)		(6,875,000)
2013-15 Adjusted Appropriation, Less Base Adjustments	**27,824,265**	**52,281,521**	**17,585,702**	**97,691,488**
Executive Recommendation Base Increases (Decreases):				
Cost to continue FY2015 salary & retirement increases	272,281	570,288	171,767	1,014,336
Decrease in 2015-17 Capital Bond Payments		(203)	(73)	(276)
Compensation package (4% per year) and health insurance & retirement increases	1,924,927	3,681,586	1,149,983	6,756,496
SBARE initiatives (1)	820,000	1,805,000	1,350,000	3,975,000
2015-17 Recommended Base General Fund Increases	**3,017,208**	**6,056,671**	**2,671,677**	**11,745,556**
Executive Recommendation One-time Increases:				
Greenhouse utilities		400,000		400,000
2015-17 Capital Projects		18,783,796		18,783,796
2015-17 Recommended One-time Increases:	-	19,183,796	-	19,183,796
2015-17 Total Executive Recommendation - General Fund	**30,841,473**	**77,521,988**	**20,257,379**	**128,620,840**
Increase (Decrease) From 2013-15 Adjusted Appropriation, Less Base Adjustments	**$ 3,017,208**	**$ 25,240,467**	**$ 2,671,677**	**$ 30,929,352**

(1) The following SBARE initiatives increases were funded (all base funding increases):

Extension - $240,000 Ag programs & capacity (1 FTE); $240,000 Community vitality (1 FTE); $340,000 Food systems & health (1 FTE)

Main Research - $800,000 Bioinformatics (2 FTE); $455,000 Precision Ag (2 FTE); $550,000 Revolving equipment fund

Branch REC's - $550,000 Revolving equipment fund; $800,000 Enhancing research capacity (4FTE)

Extension Service, Main & Branch Research Centers, and Agronomy Seed Farm
Reconciliation of 2013-15 Original Other Fund Appropriation to 2015-17 Executive Recommendation (HB 1020)

	(1) Extension Service	(2) Main Research Center	(3) Branch Research Centers	(4) Agronomy Seed Farm	(5) Total
2013-15 Original Other Fund Appropriation	**$ 24,847,809**	**$ 53,053,716**	**$ 16,001,083**	**$ 1,471,759**	**$ 95,374,367**
2013-15 additional special fund authority-capital assets	700,000				700,000
2013-15 Adjusted OF Appropriation	**25,547,809**	**53,053,716**	**16,001,083**	**1,471,759**	**96,074,367**
Base Adjustments:					
Less 2013-15 Capital Projects	(1,650,000)				(1,650,000)
2013-15 Adjusted Appropriation, Less Base Adjustments	**23,897,809**	**53,053,716**	**16,001,083**	**1,471,759**	**94,424,367**
Executive Recommendation Base Increases (Decreases):					
Cost to continue FY2015 salary & retirement increases	276,999	252,912	-	6,948	536,859
Compensation package (4% per year) and health insurance & retirement increases	1,725,226	1,593,614	329,099	44,022	3,691,961
Other changes in estimated income	420,246	2,483,823	3,573,765	10,548	6,488,382
Total requested increases (decreases)	**2,422,471**	**4,330,349**	**3,902,864**	**61,518**	**10,717,202**
2015-17 Total Executive Recommendation - Other Funds	**$ 26,320,280**	**$ 57,384,065**	**$ 19,903,947**	**$ 1,533,277**	**$ 105,141,569**

Branch Research Centers
Reconciliation of 2013-15 Original General & Other Fund Appropriation to 2015-17 Executive Recommendation (HB 1020)

	(1) Dickinson	(2) Central Grasslands	(3) Hettinger	(4) Langdon	(5) North Central	(6) Williston	(7) Carrington	(8) Total
General Fund:								
2013-15 Original General Fund Appropriation	**$ 3,678,608**	**$ 2,025,990**	**$ 2,195,790**	**$ 1,567,635**	**$ 2,015,952**	**$ 2,478,732**	**$ 3,622,995**	**$ 17,585,702**
Funds from Energy Development Impact Funding Pool	4,750		1,750		3,750	4,250		14,500
2013-15 Adjusted GF Appropriation	**3,683,358**	**2,025,990**	**2,197,540**	**1,567,635**	**2,019,702**	**2,482,982**	**3,622,995**	**17,600,202**
Base Adjustments:								
Less funds from Energy Development Impact Funding Pool	(4,750)		(1,750)		(3,750)	(4,250)		(14,500)
Reallocation of Revolving Equipment Pool for 2013-15	(125,000)	125,000	(125,000)	125,000	(125,000)	125,000		-
2013-15 Adjusted Appropriation, Less Base Adjustments	**3,553,608**	**2,150,990**	**2,070,790**	**1,692,635**	**1,890,952**	**2,603,732**	**3,622,995**	**17,585,702**
Executive Recommendation Increases (Decreases):								
Cost to continue FY2015 salary & retirement increases	32,773	20,423	21,145	15,683	19,461	23,258	39,024	171,767
Decrease in 2015-17 Capital Bond Payments		(28)			(45)			(73)
Compensation package (4% per year) and health insurance & retirement increases	203,541	130,029	162,743	108,937	108,070	204,226	232,437	1,149,983
SBARE Initiatives	310,000	55,000	310,000	55,000	180,000	385,000	55,000	1,350,000
2015-17 Recommended Base General Fund Increases	**546,314**	**205,424**	**493,888**	**179,620**	**307,486**	**612,484**	**326,461**	**2,671,677**
2015-17 Total Executive Recommendation - General Fund	**$ 4,099,922**	**$ 2,356,414**	**$ 2,564,678**	**$ 1,872,255**	**$ 2,198,438**	**$ 3,216,216**	**$ 3,949,456**	**$ 20,257,379**
Other Funds:								
2013-15 Original Other Fund Appropriation	**$ 2,525,021**	**$ 1,255,240**	**$ 2,530,112**	**$ 1,306,000**	**$ 2,626,676**	**$ 1,365,637**	**$ 4,392,397**	**$ 16,001,083**
Executive Recommendation Increases (Decreases):								
Cost to continue FY2015 salary & retirement increases								-
Compensation package (4% per year) and health insurance & retirement increases	33,038	5,150	30,708	9,090	51,510	53,371	146,232	329,099
Other changes in estimated income	804,337	102,589	178,926	22,362	355,090	910,459	1,200,002	3,573,765
2015-17 Recommended Base Other Fund Increases	**837,375**	**107,739**	**209,634**	**31,452**	**406,600**	**963,830**	**1,346,234**	**3,902,864**
2015-17 Total Executive Recommendation - Other Funds	**$ 3,362,396**	**$ 1,362,979**	**$ 2,739,746**	**$ 1,337,452**	**$ 3,033,276**	**$ 2,329,467**	**$ 5,738,631**	**$ 19,903,947**

Financial Audit

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Transmittal Letter

April 3, 2014

The Honorable Jack Dalrymple, Governor

Members of the North Dakota Legislative Assembly

North Dakota State Board of Higher Education

Dr. Dean L. Bresciani, President, North Dakota State University

We are pleased to submit this audit of North Dakota State University for the biennium ended June 30, 2013. This audit resulted from the statutory responsibility of the State Auditor to audit or review each state agency once every two years. The same statute gives the State Auditor the responsibility to determine the contents of these audits.

In determining the contents of the audits of state agencies, the primary consideration was to determine how we could best serve the citizens of the state of North Dakota. Naturally we determined financial accountability should play an important part of these audits. Additionally, operational accountability is addressed whenever possible to increase efficiency and effectiveness of state government.

The in-charge auditor for this audit was Cory Wigdahl, CFE. John Grettum, CPA was the audit manager. Inquiries or comments relating to this audit may be directed to the audit manager by calling (701) 239-7289. We wish to express our appreciation to President Bresciani and his staff for the courtesy, cooperation, and assistance they provided to us during this audit.

Respectfully submitted,

Robert R. Peterson
State Auditor

Executive Summary

Introduction

North Dakota State University is distinctive as a student-focused, land-grant, Research University, ranked by the Carnegie Commission on Higher Education among the top 108 public and private universities in the country. NDSU is in the elite category of "Research Universities/Very High Research Activity," with several programs ranked in the Top 100 by the National Science Foundation. NDSU is fully accredited as an institution by the Higher Learning Commission of the North Central Association of Colleges and Secondary Schools.

The Legislative Audit and Fiscal Review Committee (LAFRC) requests certain items be addressed by auditors performing audits of state agencies. Those items and the Office of the State Auditor's responses are noted below.

Responses to LAFRC Audit Questions

1. *What type of opinion was issued on the financial statements?*

   The financial statements for North Dakota State University were included in the Annual Financial Report of the North Dakota University System; an unqualified opinion was issued on the annual financial report of the North Dakota University System.

2. *Was there compliance with statutes, laws, rules, and regulations under which the agency was created and is functioning?*

   Yes.

3. *Was internal control adequate and functioning effectively?*

   Yes.

4. *Were there any indications of lack of efficiency in financial operations and management of the agency?*

   Yes, there were indications of a lack of efficiency in financial operations and management of North Dakota State University including "Inadequate Controls for Credit Adjustments to Student Accounts" (page 19), and "Inadequate Controls for Student Residency Determination" (page 20).

5. *Has action been taken on findings and recommendations included in prior audit reports?*

   There were no recommendations included in the prior audit report.

6. *Was a management letter issued? If so, provide a summary below, including any recommendations and the management responses.*

   Yes, a management letter was issued and is included on page 22 of this report, along with management's response to the recommendation relative to controls for waiver adjustments.

LAFRC Audit Communications

7. *Identify any significant changes in accounting policies, any management conflicts of interest, any contingent liabilities, or any significant unusual transactions.*

   None noted.

8. *Identify any significant accounting estimates, the process used by management to formulate the accounting estimates, and the basis for the auditor's conclusions regarding the reasonableness of those estimates.*

   The most significant accounting estimates used by North Dakota State University include useful lives of capital assets and allowance for uncollectible receivables. Estimated useful lives are used to compute depreciation on capital assets and are based on industry standards and experience. Management's estimate of the allowance is based on aging categories and past history. We evaluated the key factors and assumptions used to develop the estimated useful lives and allowances in determining that they are reasonable in relation to the financial statements taken as a whole.

9. *Identify any significant audit adjustments.*

   The only significant audit adjustments we proposed for the North Dakota State University related to employee tuition waiver and was recorded during the fiscal year 2013 audit of the North Dakota University System and can be seen in that audit report.

10. *Identify any disagreements with management, whether or not resolved to the auditor's satisfaction relating to a financial accounting, reporting, or auditing matter that could be significant to the financial statements.*

    None.

11. *Identify any serious difficulties encountered in performing the audit.*

    None.

12. *Identify any major issues discussed with management prior to retention.*

    This is not applicable for audits conducted by the Office of the State Auditor.

13. *Identify any management consultations with other accountants about auditing and accounting matters.*

    None.

14. *Identify any high-risk information technology systems critical to operations based on the auditor's overall assessment of the importance of the system to the agency and its mission, or whether any exceptions identified in the six audit report questions to be addressed by the auditors are directly related to the operations of an information technology system.*

    ConnectND Finance, Human Resource Management System (HRMS), and Student Administration are high-risk information technology systems critical to North Dakota State University. No exceptions related to the operations of an information technology system were noted.

Audit Objectives, Scope, and Methodology

Audit Objectives

The objectives of this audit of North Dakota State University for the biennium ended June 30, 2013 were to provide reliable, audited financial statements and to answer the following questions:

1. What are the highest risk areas of North Dakota State University's operations and is internal control adequately designed in these areas?
2. What are the significant and high-risk areas of legislative intent applicable to North Dakota State University and are they in compliance with these laws?
3. Are there areas of North Dakota State University's operations where we can help to improve efficiency or effectiveness?

Audit Scope

This audit of North Dakota State University is for the biennium ended June 30, 2013. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

North Dakota State University's main campus is in Fargo, with Extension Service and Research Experiment Station locations all across the state.

Audit Methodology

To meet the objectives outlined above, we:

- Prepared condensed financial statements from the fiscal years 2013 and 2012 annual financial reports of the North Dakota University System and developed a discussion and analysis of the financial information in the financial statements.
- Performed detailed analytical procedures including computer-assisted auditing techniques. These procedures were used to identify high-risk transactions and potential problem areas for additional testing.
- Tested compliance with laws and regulations, which included selecting representative samples to determine if laws were being followed consistently. Non-statistical sampling was used and the results were projected to the population. Where applicable, populations were stratified to ensure particular groups within a population were adequately represented in the sample, and to improve efficiency by gaining greater control on the composition of the sample.
- Tested potential improvements to operations
- Reviewed segregation of duties in all program areas.
- Performed walkthroughs in all program areas documenting client procedures.
- Interviewed appropriate agency personnel.
- Queried the ConnectND (PeopleSoft) system. Significant evidence was obtained from ConnectND.
- Observed North Dakota State University's processes and procedures.

In aggregate there were no significant limitations or uncertainties related to our overall assessment of the sufficiency and appropriateness of audit evidence.

Discussion and Analysis

The accompanying financial statements have been prepared in a condensed form to present North Dakota State University's financial position and results of operations in a manner similar to that used for financial reporting in the private sector. Also, the related note disclosures have not been included in this report. Accordingly, the accompanying financial statements are not intended to be presented in accordance with generally accepted accounting principles (GAAP).

Financial Summary

North Dakota State University's assets increased $40 million in fiscal year 2013. The largest increases between the two years include cash and investments ($27.4 million) and capital assets ($16.4 million). The increase in cash and investments is primarily due to the timing of state appropriations. The increase in capital assets was due to additions of several capital building projects, the largest being the West Dining Center ($5.3 million), Indoor Track Facility ($5.3 million), Industrial Ag and Communications Center ($1.6 million), Stevens Hall ($1.1 million), Loftsgard Hall ($983,000), Appareo Building Remodel ($932,000), Hultz Hall ($805,000), and E Morrow Lebedeff Hall ($744,000).

Liabilities increased $5.3 million in fiscal year 2013 primarily due to an increase in accounts payable. Payables increase when expenses are incurred during the year but paid after year-end. At NDSU the increase was primarily due to purchases for resale expenses attributable to merchandise sold for the 2nd football championship ($1.7 million) and project expenses for the Main Greenhouse ($800,000), purchase card correction ($850,000), and new equipment for the Enterprise Computing and Infrastructure Department ($2.4 million).

Revenues increased $28 million in fiscal year 2013 primarily due to the timing of state appropriations. North Dakota State University received total state appropriations of $238 million for the biennium, $134 million was received in fiscal year 2013 compared to $104 million in fiscal year 2012. Other significant changes were an increase in student tuition and fees of $4 million and a decrease in federal grants and contracts of $7.6 million. Student tuition and fees (which comprise 25% of total revenues) increased 4%, which was due to an increase in fees and enrollment. Federal grants and contracts decreased primarily because ARRA funds were received in fiscal year 2012 and not in fiscal year 2013.

Expenses increased $18 million in fiscal year 2013 primarily due to increases in operating expenses of $9.3 million and salaries and wages of $8.7 million. The operating expense increases were due to routine activities such as a $2.6 million increase in internal fees charged to departments, $1.4 million increase in supplies and equipment for the AES building, $717,000 increase in purchase card expenses, $869,000 increase in TV and print advertising for university relations. The increase in salaries and wages (which comprise 65% of total expenses) was 4% and considered an average market, performance, or equity adjustment.

Analysis of Significant Changes in Operations

North Dakota State University added the following:

- Master of Science Degree and Graduate Certificate in International Infectious Disease Management and Biosecurity (DMB) jointly with Makerere University, Kampala, and Uganda at a distance;
- Minor in Leadership Studies to be offered via Tri-College;
- Minor in Speech, Language, Hearing Sciences to be offered via Tri-College;

- Ph.D. in Exercise Science and Nutrition;
- Ph.D. in Counselor Education and Supervision;
- Ph.D. in Gerontology;
- Certificate in Professional Selling;
- Ph.D. in Couple and Family Therapy; and
- Minor in Managerial Psychology.

NDSU made the following organizational changes:

- From Department of Music to School of Music;
- Center for Professional Selling and Sales Technology;
- Fraud Education and Research Institute;
- Center in Leadership Practice;
- Center for Quality, Reliability, and Maintainability Engineering Organization;
- The Upper Midwest Center on Public Policy; and
- Division of Fine Arts to College of Arts, Humanities, and Social Science.

NDSU terminated the following:

- Certificates in Marketing and Human Resources Management.

NDSU established an American Indian Public Health Resource Center.

NDSU received approval for a tuition model Phase I. Full-time students would be defined as taking 15 credit hours or more and part-time students would be charged 105% of the full-time student rate.

Analysis of Significant Variances - Budgeted and Actual Expenditures

North Dakota State University had no significant variances on their statement of appropriations.

Base Level Amounts

North Dakota University System
Extension Service, Main & Branch Research Centers, and Agronomy Seed Farm
Major Components of current base level

	630 Extension	640 Main Station	641 Dickinson	642 Central Grasslands	643 Hettinger	644 Langdon	645 North Central	646 Williston	647 Carrington	649 Agronomy Seed Farm
Salaries	$ 41,886,595	$ 74,251,176	$ 3,423,626	$ 1,730,293	$ 2,335,160	$ 1,484,687	$ 2,219,763	$ 2,679,567	$ 4,277,984	$ 529,192
Operating	9,210,979	25,440,296	2,359,753	1,420,937	2,142,492	1,288,948	1,951,615	1,019,052	3,212,408	632,567
Equipment	770,000	4,703,300	425,000	130,000	250,000	100,000	475,000	150,000	525,000	310,000
Capital Projects	2,600,000	7,265,465	-	-	-	-	-	-	-	-
Total Budget	$ 54,467,574	$ 111,660,237	$ 6,208,379	$ 3,281,230	$ 4,727,652	$ 2,873,635	$ 4,646,378	$ 3,848,619	$ 8,015,392	$ 1,471,759
Funding:										
Fed Fund	$ 6,613,069	$ 5,931,138	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gen General Fund	28,919,765	58,606,521	3,683,358	2,025,990	2,197,540	1,567,635	2,019,702	2,482,982	3,622,995	-
SPEC Special Fund	18,934,740	47,122,578	2,525,021	1,255,240	2,530,112	1,306,000	2,626,676	1,365,637	4,392,397	1,471,759
Total Funding	$ 54,467,574	$ 111,660,237	$ 6,208,379	$ 3,281,230	$ 4,727,652	$ 2,873,635	$ 4,646,378	$ 3,848,619	$ 8,015,392	$ 1,471,759

Source: IBARS 2013-15, Agency Submitted

NDSU Extension Service - 630

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$28,919,765**	**$18,380,966**	**$10,538,799**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Main Research Station - 640

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$58,606,521**	**$34,516,810**	**$24,089,711**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Dickinson Research Center- 641

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$3,683,358**	**$2,423,957**	**$1,259,401**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Central Grasslands Research Center- 642

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$2,025,990**	**$1,312,763**	**$713,227**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Hettinger Research Center- 643

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$2,197,540**	**$1,591,192**	**$606,348**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Langdon Research Center- 644

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$1,567,635**	**$1,035,786**	**$531,849**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU North Central Research Center- 645

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$2,019,702**	**$1,177,947**	**$841,755**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Williston Research Center- 646

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$2,482,982**	**$1,619,878**	**$863,104**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Carrington Research Center- 647

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total General Fund Appropriation	**$3,622,995**	**$2,403,600**	**$1,219,395**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants

NDSU Agronomy Seed Farm- 649

Comparison of 2013-15 Appropriation and Estimated Spending

	2013-15 Appropriation	Actual Expenditures Through 11/30/14	Remaining Balance	Comments
Total Appropriation	**$1,471,759**	**$826,954**	**$644,805**	

Source: November 2014 Appropriation Status Report

Note: No significant changes anticipated in federal formula funds or federal grants