NORTH DAKOTA STATE UNIVERSITY

North Dakota Agricultural Experiment Station

NDSU Extension Service

2017-2019 Biennial Budget Request

Senate Bill 2020 / 2080
Senate Appropriations Committee
Senator Ray Holmberg, chair
Jan. 18, 2017

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

Dean L. Bresciani – President, North Dakota State University
Mike Beltz – Chair, State Board of Agricultural Research and Education
Ken Grafton – Vice President, Dean and Director for Agricultural Affairs, NDSU
Chris Boerboom – Director, NDSU Extension Service
Kris Ringwall – Director, Dickinson Research Extension Center
Kevin Sedivec – Interim Director, Central Grasslands Research Extension Center
Chris Schauer – Director, Hettinger Research Extension Center
Randy Mehlhoff – Director, Langdon Research Extension Center
Shana Forster – Director, North Central Research Extension Center
Jerry Bergman – Director, Williston Research Extension Center
Blaine Schatz – Director, Carrington Research Extension Center
Brian Otteson – Director, Agronomy Seed Farm

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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 June 27, 2016. 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

North Dakotans who were involved in 11 community forums in 2015 prioritized eight areas of concern related to the economic sector: struggling agricultural economy, public disconnect with agriculture, energy development, farm and business transition, labor force, natural resource protection, regulations, and rural communities. They also prioritized six areas of concern related to families and communities: health and wellness, civic engagement, successful families, infrastructure, crime and safety, and education. North Dakota is a great state in which to live, but residents experience frustrations and clearly see the potential for enhancements.

Forum participants recognized that these issues are complex, difficult issues without a single, simple solution. To make progress, multiple agencies and partners may be involved in different aspects of the issue. Because the NDSU Extension Service's mission is to provide research-based information to improve the quality of life of North Dakotans, we lead or collaborate on numerous programs across the state and within local communities that address many of the identified concerns. For instance, Extension cannot solve low commodity prices, but we provide tools for farmers to make better marketing decisions. We cannot create successful families alone, but we provide training to parents so they have better parenting skills.

NDSU EXTENSION SERVICE

To continue these relevant, community-driven programs, NDSU Extension needs sustained program support in agriculture, nutrition and wellness, leadership and civic engagement, and 4-H and youth development. Upon review of the issues from the community forums and other stakeholder needs, the State Board of Agricultural Research and Education (SBARE) prioritized the restoration of the NDSU Extension base budget as the most critical Extension need to maintain existing capacity to address state issues.

Prior to the proposed budget reduction, SBARE identified Extension's top need was increased operating funds to increase capacity to respond to the unmet needs identified during the community forums. In a manner similar to the internal grants program funded by the Legislature for precision agricultural research in the last session, Extension proposes to capitalize on existing specialists and agents to develop fixed-term projects, which target needs identified in the community forums. The need to increase Extension's delivery via media technologies must also be enhanced to support the growing demands of different generations of Extension users.

Ongoing state needs that Extension is not able to provide adequate educational programs are in the areas of farm safety, farm financial management, water quality, value added cropping systems, and pollinator management.

NDSU Extension Service

2015-2017 Legislation that Included Reporting Requirements to 2017 Appropriation Committees

HB1020 (NDSU Research & Extension, & Agronomy Seed Farm)

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 2015-17 one-time funding items included in the appropriation in section 1 of this Act:

One-Time Funding Description
Extension master gardener internships — $12,500

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.

Status: $12,500 received; funds allocated. 3 summer interns hired.

NDSU Extension Service

Update of Extension Initiatives Funded in 2015-2017 Budget

- **Costs to continue FY2015 salary increases**
  $272,281 received and allocated July 1, 2015

- **Agricultural programs and capacity**
  $247,972 received
  - $207,972 salary and fringe benefits and operating, 1.0 FTE Area Livestock Extension Specialist hired — Hettinger REC
  - $40,000 operating support; allocated

- **Junior master gardener program,** one-time funding
  $12,500 received; funds allocated. 3 summer interns hired.

- **State Soil Conservation Committee**
  $75,000 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.

NDSU EXTENSION SERVICE

2017-19 Program Initiatives as Ranked by SBARE

1 Restore Budget to 2015-17 Original Appropriation

Need: Restoration of 10 percent budget cut - $2,977,569

2 Enhancing Extension Infrastructure

Situation: This initiative to enhance Extension's infrastructure is centered on increasing annual operational support for Extension programs to address new and emerging issues that warrant immediate attention. This initiative will be innovative, invest in North Dakota citizens and regularly inform stakeholders on the impacts made through Extension programs. Funding to provide operational support for NDSU Extension's infrastructure will provide long-term assistance to respond to critical issues affecting North Dakota. This initiative will:

- Innovate - Enhance the needs assessment process and the support to act on suggestions from the public, and provide a flexible and nimble response to enhance engagement through applied projects and educational programs
- Invest - Develop a competitive funding process to meet new and emerging issues in a timely manner and provide short-term investment in areas of high potential for success
- Inform - Provide impact reports upon completion of the projects that were funded through the competitive process and prioritize the development of enhanced access to NDSU Extension project data and research, as well as results and recommendations to the public through an improved web presence, searchable databases and smartphone applications

Need: Operating - $900,000

3 Farm Safety Education

Situation: This specialist will launch a new statewide farm safety educational program to reduce agricultural and related on-farm accidents, which kill and injure too many North Dakotans. Multi-faceted educational programs will target farmers and youth.

The farm safety initiative responds to a dire need of agriculture in North Dakota. Farm accidents have been increasing steadily in the Midwest. About 374 farmers and 113 youth (age 16 to 19) die each year from farm-related accidents. Approximately 167 workers suffer from farming-related injury every day. North Dakota is not immune to these statistics. Most farmers in North Dakota have experienced or know of someone who lost a life or was injured in a farm accident. The most common accident is tractor rollover. ATV, grain bin and electrical accidents also are common. Farm safety education is effective in reducing farm accidents in other states. Leadership is needed to develop a comprehensive, persistent educational program, which can be delivered in conjunction with Extension agents to create a culture of safety on the farm.

Need: Farm Safety Education Specialist (1.0 FTE) - $240,000; operating - $60,000

2017-19 Program Initiatives as Ranked by SBARE (continued)

4 Enhancing the Agricultural Economy

Situation: Extension Farm Financial Management Specialist – This specialist will develop and deliver Extension programs that enhance the financial management skills of farmers, ranchers and agricultural professionals, and increase the likelihood of maintaining successful farm and ranch enterprises. • Farm profitability is a priority issue in agriculture today. Low crop prices, declining livestock prices and high production costs have created an environment in which the financial condition of many farms is deteriorating rapidly. This is especially affecting the younger generation of farmers. Financial management education, including investment analysis (using your money wisely), risk analysis (how much could be lost), financial structuring (financial sources and terms) and business strategy (can the enterprise mix be improved), is a critical need. A farm financial management specialist will be able to improve the financial management skills of farmers and agricultural professionals and increase the efficiency of operations.

Need: Extension Farm Financial Management Specialist (1.0 FTE) - $240,000; operating - $60,000

Situation: Extension Water Quality Specialist – This specialist will provide statewide education on water quality and quantity related to human and livestock use, energy production, nutrient management, etc. The water quality specialist was a ranked SBARE need in the last two legislative sessions. • Water is a critical element to life in our state. Science-based answers are needed on topics such as water quality for human and livestock consumption, impacts of saltwater spills, and best management practices to prevent nutrient movement to surface water. Educational programs and information are needed to assist land owners and citizens in making informed decisions when using and protecting our precious water resources. The water quality educational program will work in cooperation with agricultural and conservation groups and state regulatory agencies.

Need: Extension Water Quality Specialist (1.0 FTE) - $240,000; operating - $60,000

Situation: Extension Value-added Cropping Specialists – These specialists will develop programs to build the management skills of new and existing farmers to overcome the unique production challenges of these crops and systems. This will build the capacity of North Dakota to meet opportunities in the marketplace. Positions will be located at the Dickinson and Carrington Research Extension Centers to service the state. • The lagging agricultural economy highlights the need and opportunity for diversification, including value-added crops and production systems. Many value-added crops and production systems have high rates of return. The industry is aggressively seeking farmers to fill these increasing demands. North Dakota agriculture can aggressively pursue and invest in alternative crops and productions systems to increase the profitability of its producers. Value-added cropping specialists can educate farmers on the specialized management that is needed to produce these crops and transition into these production systems successfully.

Need: Extension Value-added Cropping Specialists (2.0 FTE) - $400,000; operating - $120,000

Situation: Extension Pollinator Specialist – This specialist will provide leadership for statewide education on best management practices for beekeepers and other pollinators. These educational efforts will support the North Dakota Pollinator Plan. • Pollinators, most often honey bees, are beneficial to the production of many of North Dakota's crops. In addition, North Dakota leads the nation in honey production, which has a value of $84 million. Unfortunately, beekeepers are suffering significant colony losses from a multitude of factors. Extension can provide educational programs on best management practices for beekeepers and education on the North Dakota Pollinator Plan for the mutual benefit of the honey industry, commercial agriculture and North Dakota residents.

Need: Extension Pollinator Specialist (1.0 FTE) - $240,000; operating - $60,000

DETAILS:
2017-2019 Program Initiatives as Ranked by SBARE

NDSU Extension Service

1. Restore Budget to 2015-2017 Original Appropriation

2. Enhancing Extension Infrastructure

Operating **$900,000**

This initiative to enhance Extension's infrastructure is centered on increasing annual operational support for Extension programs to address new and emerging issues that warrant immediate attention. This initiative will be innovative, invest in North Dakota citizens and regularly inform stakeholders on the impacts made through Extension programs. Funding to provide operational support for NDSU Extension's infrastructure will provide long-term assistance to respond to critical issues affecting North Dakota. This initiative will:

- **Innovate** — Enhance the needs assessment process and the support to act on suggestions from the public, and provide a flexible and nimble response to enhance engagement through applied projects and educational programs
- **Invest** — Develop a competitive funding process to meet new and emerging issues in a timely manner and provide short-term investment in areas of high potential for success
- **Inform** — Provide impact reports upon completion of the projects that were funded through the competitive process and prioritize the development of enhanced access to NDSU Extension project data and research, as well as results and recommendations to the public through an improved web presence, searchable databases and smartphone applications

3. Farm Safety Education

1.0 FTE Farm safety education specialist **$240,000**
Operating **$160,000**

This specialist will launch a new statewide farm safety educational program to reduce agricultural and related on-farm accidents, which kill and injure too many North Dakotans. Multi-faceted educational programs will target farmers and youth.

The farm safety initiative responds to a dire need of agriculture in North Dakota. Farm accidents have been increasing steadily in the Midwest. About 374 farmers and 113 youth (age 16 to 19) die each year from farm-related accidents. Approximately 167 workers suffer from farming-related injury every day. North Dakota is not immune to these statistics. Most farmers in North Dakota have experienced or know of someone who lost a life or was injured in a farm accident. The most common accident is tractor rollover. ATV, grain bin and electrical accidents also are common. Farm safety education is effective in reducing farm accidents in other states. Leadership is needed to develop a comprehensive, persistent educational program, which can be delivered in conjunction with Extension agents to create a culture of safety on the farm.

4. Enhancing the Agricultural Economy

1.0 FTE Farm financial management specialist **$240,000**
Operating **$60,000**

This specialist will develop and deliver Extension programs that enhance the financial management skills of farmers, ranchers and agricultural professionals, and increase the likelihood of maintaining successful farm and ranch enterprises.

Farm profitability is a priority issue in agriculture today. Low crop prices, declining livestock prices and high production costs have created an environment in which the financial condition of many farms is deteriorating rapidly. This is especially affecting the younger generation of farmers. Financial management education, including investment analysis (using your money wisely), risk analysis (how much could be lost), financial structuring (financial sources and terms) and business strategy (can the enterprise mix be improved), is a critical need. A farm financial management specialist will be able to improve the financial management skills of farmers and agricultural professionals and increase the efficiency of operations.

1.0 FTE Water quality specialist **$240,000**
Operating **$60,000**

This specialist will provide statewide education on water quality and quantity related to human and livestock use, energy production, nutrient management, etc. The water quality specialist was a ranked SBARE need in the last two legislative sessions.

Water is a critical element to life in our state. Science-based answers are needed on topics such as water quality for human and livestock consumption, impacts of saltwater spills, and best management practices to prevent nutrient movement to surface water. Educational programs and information are needed to assist land owners and citizens in making informed decisions when using and protecting our precious water resources. The water quality educational program will work in cooperation with agricultural and conservation groups and state regulatory agencies.

2.0 FTE Value-added cropping specialists **$400,000**
Operating **$120,000**

These specialists will develop programs to build the management skills of new and existing farmers to overcome the unique production challenges of these crops and systems. This will build the capacity of North Dakota to meet opportunities in the marketplace. Positions will be located at the Dickinson and Carrington Research Extension Centers to service the state.

The lagging agricultural economy highlights the need and opportunity for diversification, including value-added crops and production systems. Many value-added crops and production systems have high rates of return. The industry is aggressively seeking farmers to fill these increasing demands. North Dakota agriculture can aggressively pursue and invest in alternative crops and productions systems to increase the profitability of its producers. Value-added cropping specialists can educate farmers on the specialized management that is needed to produce these crops and transition into these production systems successfully.

1.0 FTE Pollinator specialist **$240,000**
Operating **$60,000**

This specialist will provide leadership for statewide education on best management practices for beekeepers and other pollinators. These educational efforts will support the North Dakota Pollinator Plan.

Pollinators, most often honey bees, are beneficial to the production of many of North Dakota's crops. In addition, North Dakota leads the nation in honey production, which has a value of $84 million. Unfortunately, beekeepers are suffering significant colony losses from a multitude of factors. Extension can provide educational programs on best management practices for beekeepers and education on the North Dakota Pollinator Plan for the mutual benefit of the honey industry, commercial agriculture and North Dakota residents.

NDSU EXTENSION SERVICE

2015 Community Forums

STATEWIDE REPORT

327 PARTICIPANTS

GENDER

- **51%** Male
- **49%** Female

AGE

- **2%** Younger than 20
- **8%** 20 to 29
- **13%** 30 to 39
- **17%** 40 to 49
- **27%** 50 to 59
- **22%** 60 to 69
- **11%** Older than 69

OCCUPATION

- **14%** Education
- **20%** Government
- **27%** Farming/agriculture
- **13%** Business
- **11%** Retired
- **15%** Other

ETHNICITY

- **97%** White
- **3%** American Indian or Alaska Native

LIVED IN COMMUNITY

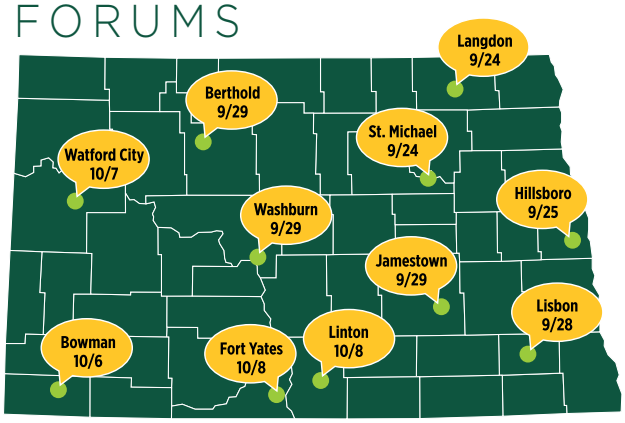
- **3%** Less than 1 year
- **12%** 1-5 years
- **6%** 6-10 years
- **11%** 11-20 years
- **35%** More than 20 years
- **33%** All of my life

The NDSU Extension Service is listening. NDSU Extension staff recognize that to be most effective, they need to listen to local stakeholders and regularly ask about crucial issues and challenges affecting each region.

Community forums during the fall of 2015 provided an opportunity to listen to North Dakotans across the state as they shared concerns around:

Thank you to the more than 300 people who participated in the 11 community forums. The information will help shape NDSU Extension's strategic planning efforts during the next three to five years and help us create the Extension programs that will most strongly align with the needs and priorities of North Dakota residents.

11 COMMUNITY FORUMS



EXTENDING KNOWLEDGE. CHANGING LIVES.

Agriculture, Energy, Natural Resources and the Economy

NDSU EXTENSION SERVICE

Priority Issues of Concern to Community Forum Participants

AG ECONOMY

Agriculture is critical to the North Dakota economy. Fluctuations in the agricultural economy bring challenges to farmers, especially in these lean times. More agricultural diversification and value-added products are needed to help farm families and communities.

PUBLIC DISCONNECT WITH AGRICULTURE

We say we can feed the world, yet there is a growing lack of general understanding about where food comes from. Farm-to-table consumer education programs about local foods and food production are needed for all ages.

ENERGY DEVELOPMENT

Fluctuating oil prices can cause dramatic shifts in North Dakota's economy, creating uncertainty. Additional areas of challenge in energy development include protecting natural resources in the Oil Patch Region, developing necessary infrastructure and preparing communities for changing dynamics.

FARM AND BUSINESS TRANSITION

As North Dakota ages, barriers to effectively enter and exit farming operations and other businesses need to be overcome to ensure a successful transition from one generation to the next.

LABOR FORCE

Recruiting and retaining an effective workforce across the state is a growing challenge. Adequate wages and benefits, and options for worker flexibility are two key factors. Retention of a young and vital workforce also requires affordable housing, good-quality child care and local community amenities.

NATURAL RESOURCES PROTECTION

Adequate water supplies, good-quality air and water, soil health and tree renovation are concerns. Being good stewards of the state's natural resources and using green technology, such as wind and other renewables, is recommended, as is expansion of local recycling programs.

REGULATIONS

Sustaining industry is viewed as difficult because of existing and proposed regulations in energy development and agriculture. One-size-fits-all federal agency regulations don't take into consideration variables that are unique to location. Oversight or flexibility at the state or local level is preferred.

RURAL COMMUNITIES

Keeping main streets viable through succession planning for businesses, economic development and updates to infrastructure are essential to sustain rural communities. Quality-of-life amenities are needed to attract and keep people in rural North Dakota.

Children, Families and Communities

NDSU EXTENSION SERVICE

Priority Issues of Concern to Community Forum Participants

HEALTH AND WELLNESS

Awareness education about chemical and other addictions, mental health issues and physical health is needed. Access to and quality of health care is a major concern, particularly in rural areas where medical personnel and emergency medical services volunteers are limited or not available. Also of concern is the increase of unhealthy lifestyles, and ongoing inaccessibility to nutritious foods and exercise programs or facilities.

CIVIC ENGAGEMENT

Gaps exist in participation and commitment at the local level. Positive changes in communities happen when adults and youth are engaged civically as volunteers and leaders. Successful community involvement and volunteerism hinges on the development of leadership skills and mentoring.

SUCCESSFUL FAMILIES

Many families are struggling. Families today are bombarded with competing priorities that are changing family dynamics. Frequently heard are that youth are overscheduled, changing cultures and technology are limiting family time, good-quality child care can't be found, and morals and ethics are on the decline. Financial security also is a major concern with an increase in poverty and the difficult challenges it causes.

INFRASTRUCTURE

Improvement to infrastructure is needed for the long-term development and resiliency of North Dakota. Housing, roads, child-care facilities, schools and public buildings need attention for safety reasons and because a lack of sufficient infrastructure impedes the recruitment and retention of the rural workforce.

CRIME AND SAFETY

Sex trafficking, drug and alcohol abuse, burglaries, sex offenders and an increase in crime are huge concerns, especially in western North Dakota. Ranking just as high, however, is Internet, social media and texting safety, and the increasing prevalence of cyber-bullying and sexting, especially among youth.

EDUCATION

Additional support is needed for pre-K through 12th-grade education systems, including more teachers and programs in many areas. Overcrowding of schools in some communities and declining enrollments in others is creating unique challenges, with discussion of regional collaboration more important than ever in some areas.

EXTENDING KNOWLEDGE. CHANGING LIVES.

NDSU EXTENSION SERVICE

The NDSU Extension Service mission is to provide research-based information to improve the quality of life of North Dakotans. Based on concerns of North Dakotans involved in the 11 community forums, three critical areas emerged: **economic prosperity, community engagement** and **healthy citizens**.

Potential Extension responses based on the community forum suggestions include:

ECONOMIC PROSPERITY:
Education for informed decisions and profitable economies

- Enhance agricultural diversification programs to include entrepreneurship and value-added components
- Educate about financial security to help sustain farm and ranch operations and small business, and to assist families with household budgeting
- Partner with organizations to help rural communities plan for their future
- Educate on the benefits of best management practices to sustain good-quality air, soil, water and other natural resources

COMMUNITY ENGAGEMENT:
Education for engaged, productive North Dakotans

- Strengthen character and ethics education for youth and adults, with parents as first teachers
- Reinforce local leadership training for adults and youth to develop skills and confidence in leading and becoming more civically engaged
- Facilitate succession planning to equip generations for successfully transitioning farm and ranch operations, and other businesses
- Mobilize communities around issues of concern such as protecting natural resources, updating infrastructure, developing the workforce and managing change

HEALTHY CITIZENS:
Education on food production, nutrition and healthful living

- Strengthen farm-to-table-related programs for youth, adults and urban communities
- Educate about safe food production and consumption, and the importance of good nutrition and wellness
- Convene conversations to address addictions, and mental and physical health challenges
- Focus on safety for youth, family and the farm
- Facilitate the development of healthful environments at the community level

As Extension considers these needs, we remain committed to our current successful programs in agriculture, natural resources, 4-H, families and communities.

EXTENDING KNOWLEDGE. CHANGING LIVES.

NDSU EXTENSION SERVICE
Takes Action

2016

After listening to North Dakotans' current concerns about issues related to agriculture, energy, natural resources, the economy, children, families and communities during community forums across the state in 2015, the NDSU Extension Service responded by developing a number of new programs as well as strengthening other relevant programs already in place.

These responsive programs are framed around three key areas:

Economic Prosperity — education for informed decisions and profitable economies

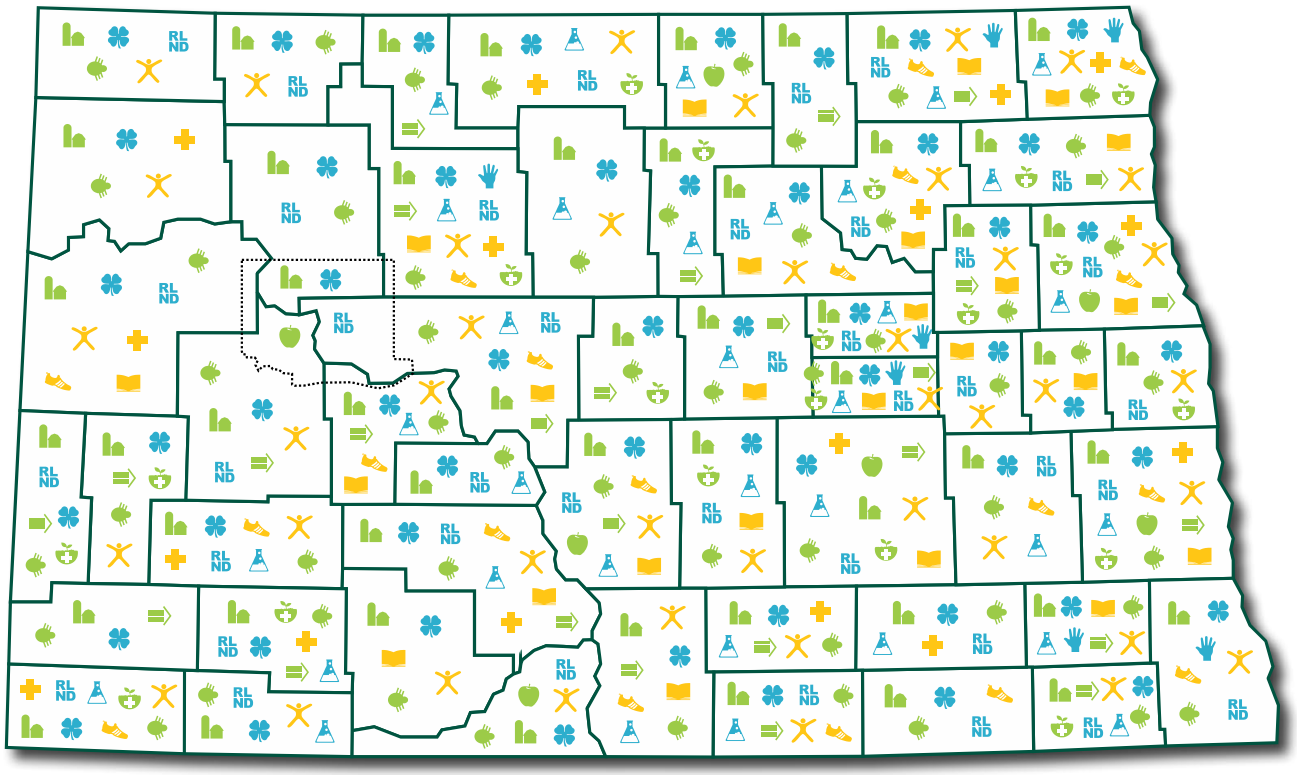
Community Engagement — education for involved, productive North Dakotans

Healthy Citizens — education on food production, nutrition and healthful living

Extension state and area specialists and county-based agents in all 53 counties work collaboratively to deliver these and many other educational programs.

Although issues and technologies have changed since the Cooperative Extension Service was created in 1914, NDSU Extension continues to be responsive to people's needs, and remains committed to extending knowledge and changing lives now and in the future.

Programs in the three key areas, as well as many others, are improving the lives of North Dakotans in all 53 counties.



EXTENDING KNOWLEDGE. CHANGING LIVES.

A sample of current educational programs:

NDSU EXTENSION SERVICE

BUILDING ECONOMIC PROSPERITY

North Dakotans receive education that helps them make informed decisions, ultimately building profitable farms, businesses and households. For example:

With Extension agent assistance, **4,040 farm operators** worked with NDSU Extension's online Farm Bill Decision Aid spreadsheet to make decisions related to the new farm bill, and in a follow-up survey, 90 percent of respondents used the decision aid tool when making their final farm bill decisions.

As a result of more healthful diets and reduced chronic disease, potential savings in long-term health-care costs range from **$3.62** to **$12.50** for every $1 spent on the Expanded Food and Nutrition Education Program (EFNEP).

Soil health café talks, cover crop demonstration sites and salinity management field days give producers opportunities to learn techniques to make soil healthy again and better manage salinity and improve soil health.

One year after the Extension workshop, **75 percent** of Design Your Succession Plan survey respondents reported having conversations, making decisions and meeting with professionals to create succession plans to keep their farm/ranch legacies alive.

Providing producers, gardeners and homeowners with strategies for controlling pests, diseases and weeds is a major part of the Integrated Pest Management program. These strategies delivered through a weekly Crop and Pest Report and local Extension agents are aimed at keeping a pest, disease or weed out of an area and showing producers how to monitor their fields, identify pests and determine economic thresholds.

DRIVING COMMUNITY ENGAGEMENT

Extension specialists and agents provide education and facilitation to encourage citizens to be engaged in their local communities to support agriculture and a positive quality of life. Results include:

235 volunteer groups across North Dakota have members and emerging leaders better prepared and more confident to serve on boards, councils or committees because of Extension's one-day Lead Local program. Extension also developed Lead Local for youth to provide them with tools for civic engagement.

4-H, the largest and only research-based youth organization in the state, provided hands-on, real-life experience through projects, activities and events to **29,306 youth** in 2016. 4-H youth are four times more likely to contribute to their communities than youth not involved in 4-H.

RL ND Rural Leadership North Dakota participants have acquired more than **$4 million** to complete local projects they've initiated across the state. This 18-month program has been preparing and developing effective leaders to strengthen North Dakota since 2003.

Youth at **30 North Dakota sites** have participated in 4-H National Youth Science Day, the world's largest youth-led science experience designed to help train youth for the workforce in science, technology, engineering and math topics and issues.

PRODUCING HEALTHY CITIZENS

North Dakotans receive education on food production, nutrition and healthful living. Impacts include:

AG More than **12,000 youth** are involved annually with Extension farm-to-table programs, including Ag in the Gym, Ag Careers, Ag Literacy and Junior Master Gardener, which are taught by local Extension agents. These programs provide information about local foods and food production to ensure a better understanding of the connection between agriculture and the food we eat.

186 individuals from law enforcement, K-12 education and communities participated in Mental Health 101 broadcasts to learn how to recognize signs and symptoms of people dealing with mental health challenges.

96 percent of Stepping On program participants reported practicing techniques for standing, walking, and climbing curbs and stairs safely. Stepping On, a national evidence-based program, teaches older adults how to avoid falling, increasing the likelihood of seniors being able to stay in their homes and age in place.

More than **9,000 elementary school students** per year benefit from nutrition and wellness education programs that result in students eating more fruits and vegetables, being more physically active and understanding how food gets from the field to the table.

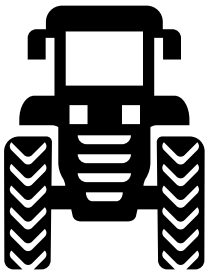
EXTENDING KNOWLEDGE. CHANGING LIVES.

NDSU EXTENSION SERVICE

Extension helping North Dakota through **agriculture and natural resources**: A SNAPSHOT

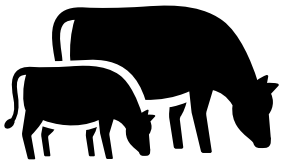
Agriculture is critical to the economy of North Dakota and routinely accounts for approximately 30 percent ($9.1B in 2015) of all business activity in the state. Extension Agriculture and Natural Resources' (ANR) specialists and county based agents work to ensure that the latest research based information is available to all who seek it. These same specialists and agents continually probe and listen for agriculture's next "need", and develop innovative educational programs and field studies to meet those needs as fast as possible.

Approximately **15,000** **producers** attended Extension **farm bill education meetings**



90% of respondents used the **Extension-developed farm bill decision aid tool** when making their final decision with FSA; of these respondents, **83% used the decision tool for ALL** of their acres

6,100 **downloads** of the Extension **Pest Management App** since 2014, combining the Extension Plant Disease Management, Insect Control and Weed Control guides into a digital form



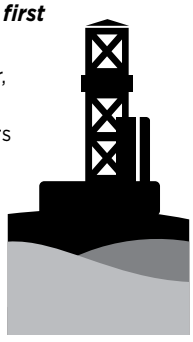
78% of respondents indicated a **$15,500** **increase in whole herd value** per operation after participation in the Extension **artificial insemination (AI) breeding education program**

92% 

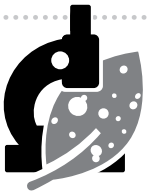
of responding **gardeners** plan to change their gardening practices after participating in the 2015 online **Spring Fever Garden Forums**

More than **150** landowners, community members and oil company representatives **increased their understanding** of their rights, the land reclamation process, and how to communicate and negotiate at Extension-led workshops

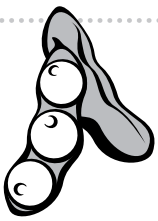
"This was long overdue. This should have happened when the oil industry first came to town."
Thomas Wheeler,
Vice-President
NW Land Owners
Association



Over **2,860** **samples processed** at the self-funded NDSU **Plant Diagnostic Laboratory** in 2015 resulted in **informed pesticide use decisions and economic savings** for North Dakotans



3X **more soil samples** were tested for **soybean cyst nematode (SCN)** since 2013 because of county Extension office test kit distribution



Estimated **$160** **per acre value** for SCN detection and management

Since 2014, **275** North Dakota families **evaluated 110 home garden varieties** resulting in over 1,000 analyzed trials

85% of responding families reported **more productive gardens**

76% **of children** in responding families who grew vegetables **improved their diets**

For more information on these and other impacts of the NDSU Extension Service, go to www.ag.ndsu.edu/extension or contact Charlie Stoltenow at 701.231.7171 or charles.stoltenow@ndsu.edu.

NDSU EXTENSION SERVICE

Extension helping North Dakota through **4-H**: A SNAPSHOT

4-H prepares youth for success and the challenges that face North Dakota. It contributes to the development of new leaders, encourages innovation and entrepreneurship, teaches good stewardship, and helps youth acquire important life skills that prepare them to be career- and work-ready.

Current priorities include helping youth develop science interests, skills and abilities in the areas of agriculture, energy, environmental stewardship and technology. Youth learn the importance of food access, where their food comes from, and how to make healthful food choices and live healthy lives. They develop leadership skills and understand the importance of giving back to their communities and society.

Youth throughout the U.S., including North Dakota, participated in research to define and measure positive youth development (Source: Lerner and Lerner 2011). **Compared with their peers, youth involved in 4-H programs are:**

2X **more likely to participate in STEM activities**

98% of youth who attended GEAR-Tech-21 camp reported they would feel comfortable **teaching robotics** to others

75% of youth participants in the Drone Discovery/National Youth Science Day Experiment reported it made them **more interested in science**

2X **more likely to make healthier choices**

90% of youth participating in the Healthy Camp Challenge said they planned to continue to **practice healthful activities**

28 4-H clubs with **433** youth earned the designation of **Healthy 4-H Club** in 2016

2X **more likely to be civically active**

76% of youth attending **Civic U** reported an increased effort to allow everyone to have a voice in **decision making**

1,000+ **youth** demonstrate **leadership skills** through 4-H club offices, 4-H Ambassadors, or special projects

4X **more likely to give back to their communities**

777 **volunteer service hours** contributed to the state by North Dakota 4-H Ambassadors

49 **blankets made and donated** to the Project Linus program by youth attending the Extension Youth Conference

North Dakota 4-H Camp

record **558** youth at North Dakota 4-H Camp near Washburn

86% of campers reported learning **new skills**

89% of campers **made new friends**

59% of campers demonstrated **more independence**

50% of campers are **more willing to participate** in other activities

50% of campers improved in **problem solving**

19% 4-H enrollment increase in past five years

North Dakota 4-H in 2015-16

29,306 youth participants

6,247 enrolled 4-H members

1,007 youth in 4-H camping programs

2,534 volunteers

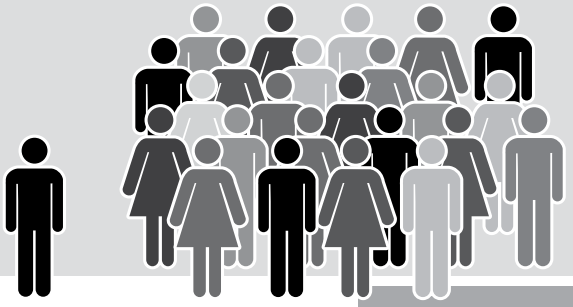
342 youth volunteers

For more information on these and other impacts of the NDSU Extension Service, go to www.ag.ndsu.edu/extension or contact Brad Cogdill at 701.231.7259 or brad.cogdill@ndsu.edu.

NDSU EXTENSION SERVICE

Extension helping North Dakota through **leadership and civic engagement**: A SNAPSHOT

NDSU Extension is working to meet the demand for leadership and civic engagement by helping new and existing leaders build their skills, confidence and willingness to lead through cohort groups and local training sessions. Here are some of those programs:



Lead Local is a training for aspiring, elected and appointed officials to help them feel better prepared to serve as an effective board, council or committee member.

283+ volunteer groups had members participate in Lead Local and become engaged civically in their communities

89% understand their board member tasks

77% feel comfortable handling conflict during a meeting

89% feel prepared to serve on a board, council or committee

Lead Local for Youth and **Civic U** give junior and senior high youth an opportunity to become familiar with civic responsibility, service and parliamentary procedure during day-long programs.

For more information on these and other impacts of the NDSU Extension Service, go to www.ag.ndsu.edu/extension/ccv or contact Lynette Flage at 701.231.7782 or lynette.flage@ndsu.edu.

Rural Leadership North Dakota (RLND) is an 18-month leadership development program designed to strengthen agriculture, local communities and the state for the future.

$4 million acquired by participants to complete local projects

19 participants have run for office; three were elected during the last election cycle

Stronger Economies Together (SET) enhances the capacity of people in rural communities to implement an economic development blueprint that builds on the region's emerging economic strengths. SET has:

- Strengthened **communication and partnerships** between health-care administrations
- Raised **$60,000+ in scholarship support** for students who will return to the region in a health-related career
- **Initiated critical conversations** regarding local foods and started groundwork to facilitate change for entrepreneurs at a federal level
- Cultivated **civically engaged youth** by encouraging participation in community planning and training them to be effective board, council or committee members
- Created a **unified tourism vision** for the region

(Funded and in collaboration with USDA Rural Development)

North Dakota Leadership by the numbers:

8,314
North Dakota nonprofit organizations and governmental units requiring people to serve in leadership roles

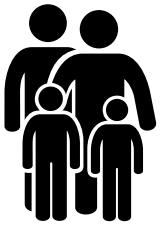
1 in 24
people age 18 and older needed to meet the leadership demand

NDSU EXTENSION SERVICE

Extension helping North Dakota through **family and consumer sciences**: A SNAPSHOT

Health and wellness are among North Dakota's biggest challenges. An individual's quality of life can quickly change because of chronic disease, financial hardships and family issues. Preventing these life challenges in many cases can be done by identifying key factors and responding with targeted educational programs.

To help ensure the state has healthy people and communities, NDSU Extension's family and consumer sciences (FCS) programs focus on three key areas: personal and family finance, human development and family science, and nutrition, food safety and health. Programming in these areas prevent future problems and evidence indicates these programs are making a difference. As a result of FCS programs:



82% of parents completing the Gearing Up for Kindergarten program rated the program as **very/extremely useful**

(Nearly half of all Kindergarten students are not prepared for success when entering school.)

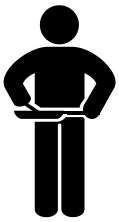
79% of seniors in the Stepping On program **reduced falling hazards** at home

(Falls are the number one reason for elderly having to leave their homes.)

94% of farmers/ranchers in the Design Your Succession Plan program **are prepared to meet with professional**

"It gave me a road map of what I want to do."
David Miller, Donnybrook-area producer

8.5% of all North Dakota households are food insecure. 14.5% of all North Dakota children live in poverty, 31.3% of school-enrolled children receive free and reduced meals and 15% of children are obese (source RWJF 2011). Extension's FCS programs are making a difference:



83% of participants in the Expanded Food and Nutrition Education Program **improved at least one nutrition practice**

and

47% **improved at least one food safety practice**

63% of adults in the Family Nutrition Program **spend their food budget more wisely**

62% of youth in On the Move to Better Health **increased their daily physical activity**

58% of youth in On the Move to Better Health chose **more healthful snacks**

and

54% **ate more fruits and vegetables**

For more information on these and other impacts of the NDSU Extension Service, go to www.ag.ndsu.edu/extension or contact Deb Gebeke at 701.231.9688 or debra.gebeke@ndsu.edu.

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 June 27, 2016. 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

The NDAES continues to focus on developing its infrastructure to effectively conduct research needed by the agricultural sector in the state. 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 novel 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.

The Meat Science laboratory, built in the 1950's and last renovated in the 1970's, is in very poor condition. A new facility is needed to allow our scientists to conduct cutting-edge research in meat quality, meat science, muscle biology, and physiology. Such a facility would enhance our ability to

carry out much-needed research for the livestock sector on end-use quality traits. As with other newer facilities, such as the new agronomy labs at the RECs, as well as the AES greenhouse and the animal research complex at the Main Station, a new Meat Science laboratory would have 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. Technology is changing almost daily, and we are developing the appropriate public-private partnerships with technology providers to ensure that our scientists have access to the best technologies available for their research programs.

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 there is little resistance, and identifying and responding to livestock producer concerns over outbreaks of zoonotic diseases are fundamental to the mission of the NDAES. The 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 security, food safety, natural resources management, and new bioproducts (including fuel) need to continue in order to allow NDAES to serve this segment of agriculture. Similarly, a systems approach (from conception to consumption) for livestock research has been implemented to better serve this important and growing sector of 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. Reductions in numbers of scientists to comply with existing state revenues will further hamper our ability to provide unbiased, science-based information to our stakeholders and to one of the pillars of the state's economy.

North Dakota Agricultural Experiment Station

2015-2017 Legislation that Included Reporting Requirements to 2017 Appropriation Committees

HB1020 (NDSU Research & Extension, & Agronomy Seed Farm)

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 2015-17 one-time funding items included in the appropriation in section 1 of this Act:

One-Time Funding Description
Agronomy laboratories - $150,000
Rural leadership project - $150,000
Dust issues technical support - $100,000
Seed cleaning plants - $4,500,000
Veterinary diagnostics laboratory - $18,000,000 (SIIF funds)
Souris River flooding - $72,500

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.

- Agronomy laboratories (CGREC) - $550,000
  Status: $400,000 received GF carryover from 2013-15
  $150,000 OF authorized 2015-17
  Construction underway - estimated completion Spring of 2017
  (See Central Grasslands REC forage agronomy lab facilities page 29)

- Rural leadership project
  Status: $150,000 received for leadership program. Includes the following leadership projects:

  1) Igniting Legendary Leaders Conference – April 27-28, 2016
     - 120 individuals from North Dakota attended.
     - 17 speakers shared stories of how they "ignited" an idea and turned it into action
     - Key points for conference attendees included:
       - Be more involved in your community.
       - Jump in and get involved.
       - Rethink current processes for engaging with others.
       - Think outside the box and share your story.

  2) Inspiring Legendary Leaders Conference – April 11, 2017
     - Speakers will focus on leadership stories about how to take action on ideas you are passionate about.
     - The conference will be held at the Heritage Center in Bismarck.
     - Ignite speakers will include individuals who are working on projects in their community.

- Dust issues technical support
  Status: $100,000 operating support received; allocated. Extensive data gathered summer of 2016 on soil disturbance and dust from truck traffic. Data is currently being analyzed.

- Seed Cleaning
  Status: Seed cleaning projects underway at Carrington REC and North Central REC

  Carrington REC ($750,000 General Fund, $1,500,000 Other Fund authorization)
  A 40ft x 75ft with 30ft sidewall building has been constructed to house seed cleaning equipment. The floor is cement at a minimum depth of 7 inches. Equipment bid out and on order include air screen, indent separator, and gravity table. Additional items in the process of requesting bids include seed transfer equipment (grain legs; belt, vibratory and auger conveyors), elevated stands, and platform for mounting equipment.

  North Central REC ($750,000 General Fund, $1,500,000 Other Fund authorization)
  Fundraising is underway and a site is being selected for a seed cleaning facility. Equipment expected to be purchased by June 2017, with construction complete by fall 2017.

- Souris River flooding - $72,500
  Status: (See Souris river research report page 43)

- Veterinary Diagnostics Laboratory - $18,000,000 (SIIF funds)
  Status: (See pages 27-28)

SECTION 5 APPROPRIATION — LANGDON RESEARCH EXTENSION CENTER. There is appropriated out of any moneys in the general fund in the state treasury, not otherwise appropriated, the sum of $175,000, and from special funds, the sum of $175,000, or so much of the sum as may be necessary, to the Langdon research extension center for the purpose of purchasing the real property described in section 4 of this Act, for the period beginning with the effective date of this section, and ending June 30, 2017. The funding provided in this section is considered a one-time funding item.

Status: The land was purchased for $350,000

SECTION 11 DICKINSON RESEARCH EXTENSION CENTER — MINERAL RIGHTS INCOME. 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.

Status: Oil Revenue received July 1, 2015 to November 30, 2016 - $123,819

SECTION 12 WILLISTON RESEARCH EXTENSION CENTER — MINERAL RIGHTS INCOME. The Williston research extension center shall report to the sixty-fifth legislative assembly on the 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.

Status: July 1, 2013 to June 30, 2015 - Amounts received $491,230; Amounts spent $0
July 1, 2015 to November 30, 2016 - Amounts received $132,048; Amounts spent $571,788

SECTION 19. 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.

Agronomy Lab Carryover Status

Project	GF carryover	Amount spend 12/31/2016
Langdon	$33,457.86	$33,457.86
Carrington	$101,024.58	$101,024.58
Central Grasslands	$365,654.33	$365,654.33

North Dakota Agricultural Experiment Station

Update of NDAES Initiatives Funded in 2015-2017 Budget

SBARE ranked/unranked initiatives:

- **Costs to continue FY2015 salary increases**
  $741,779 received and allocated July 1, 2015

- **Bioinformatics**
  $800,000 received; salary and fringe benefits, 2.0 FTE bioinformaticists; hired

- **Precision ag**
  $600,000 received; operating support — Internal grant committee formed; 25 proposals totaling $1.8M submitted; funding allocated to 9 projects (see precision ag initiative impacts preliminary results page 41)

- **Enhancing research infrastructure for greater research efficiencies and effectiveness**
  $1,100,000 received operating support- revolving equipment fund; allocated

- **Enhancing research capacities at RECs**
  $670,000 received
  - $130,000 salary and fringe benefits , 1.0 FTE Animal Science technical support staff — HREC; position descriptions being developed
  - $330,000 salary and fringe benefits , 2.0 FTE plant pathologist and technical support — WREC; hired
  - $210,000 operating support — LREC, CGREC, NCREC, WREC, HREC, CREC, DREC; allocated

Capital and one-time funding:

- **Veterinary diagnostic lab replacement**
  $18,000,000 received; Construction underway — estimated completion Summer of 2017

- **Seed cleaning facilities**
  $4,500,000 received ($1.5M General, $3M Other)
  - Carrington REC ($750,000 General Fund, $1,500,000 Other Fund authorization)
    A 40ft x 75ft with 30ft sidewall building has been constructed to house seed cleaning equipment. The floor is cement at a minimum depth of 7 inches. Equipment bid out and on order include air screen, indent separator, and gravity table. Additional items in the process of requesting bids include seed transfer equipment (grain legs; belt, vibratory and auger conveyors), elevated stands, and platform for mounting equipment.
  - North Central REC ($750,000 General Fund, $1,500,000 Other Fund authorization)
    Fundraising is underway and a site is being selected for a seed cleaning facility. Equipment expected to be purchase by June 2017, with construction complete by fall 2017.

- **Dust Issues technical support**

  $100,000 operating support received; allocated. Extensive data gathered summer of 2016 on soil disturbance and dust from truck traffic. Data is currently being analyzed.

- **Grasslands recovery: Souris river flooding research funding**

  $72,500 received and allocated
  (See Souris river research report page 43)

- **Land purchase — LREC**

  $350,000 received ($175k General, $175k Other); purchased

- **Leadership program**

  Status: $150,000 received for leadership program. Includes the following leadership projects:

  1) Igniting Legendary Leaders Conference – April 27-28, 2016
     - 120 individuals from North Dakota attended.
     - 17 speakers shared stories of how they "ignited" an idea and turned it into action
     - Key points for conference attendees included:
       - Be more involved in your community.
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  2) Inspiring Legendary Leaders Conference – April 11, 2017
     - Speakers will focus on leadership stories about how to take action on ideas you are passionate about.
     - The conference will be held at the Heritage Center in Bismarck.
     - Ignite speakers will include individuals who are working on projects in their community.

Capital and one-time funding:

- **Agronomy laboratories**

  $400,000 received
  - CGREC ($400k General, $150k Other)

  Construction underway, estimated completion Spring 2017.

North Dakota Agricultural Experiment Station

Veterinary Diagnostic Lab

FACILITIES

A new and modern facility to house the veterinary diagnostic laboratory (VDL) should be a minimum of 20,000 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 samplesfor 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.

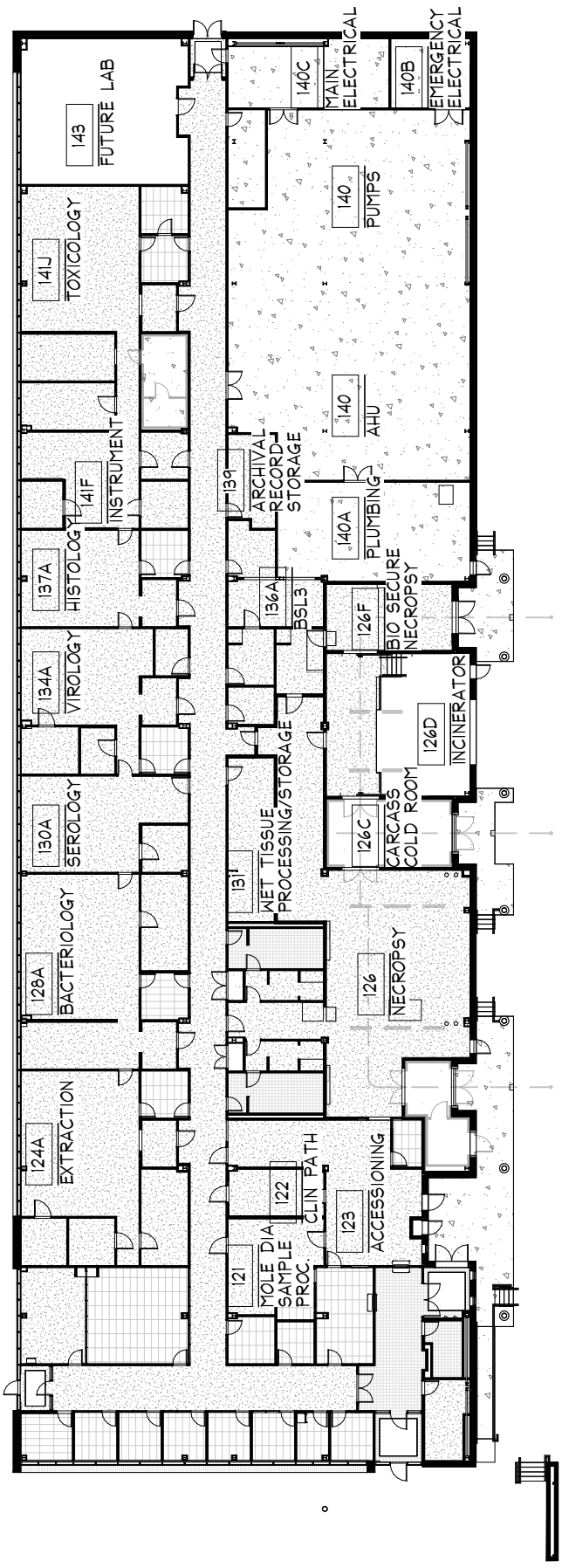
This was SBARE's #1 ranked Capital Project for the 2015-17 Legislative Session. The Legislature provided $18,000,000 from the Strategic Investment and Improvements Fund (SIIF).

Timeline:

- April 2015 — HB 1020 Passed, including $18,000,000 for new VDL, which is declared to be an emergency measure
- Summer 2015 — Architects are interviewed and hired
- Fall 2015 – Jan. 2016 — Architects design building
- January 2016 — Project is bid, low bids accepted
- Spring 2016 — Construction begins
- November 2016 — Building is enclosed
- Summer 2017 — estimated completion

Architectural Design:

November 2016 view:



Floor plan of the veterinary diagnostic laboratory

Central Grasslands REC Forage Agronomy Lab

FACILITIES

Central Grasslands REC Forage Agronomy Lab
$550,000 Project ($400,000 GF, $150,000 OF)
Construction underway, estimated completion Spring 2017.

Timeline:

- May 2013 — Legislature authorized funding as requested $400,000 in SB 2020, General Funds
- Fall/Winter 2013 — Project design
- Feb. 2014 — Project was bid and came in significantly over budget
- Spring 2015 — Additional Authorization of $150,000 in Other Funds included in HB 1020
- Fall 2015 — Addition design work completed
- Feb. 2016 — Successful bid opening
- Spring 2016 — Construction began
- Spring 2017 — Estimated completion

Architectural Design:

November 2016 view:

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2017-19 Program Initiatives as Ranked by SBARE

1 Restore Budget to 2015-17 Original Appropriation

Need: Restoration of 10 percent budget cut:

Branch RECs	$1,979,845
Main Station	$5,734,511
Total AES	$7,714,356

2 Oakes Irrigation Site

Situation: The Oakes Irrigation Site has been funded through the Garrison Conservancy District. This funding no longer will be available in the near future (as committed funding) due to reallocation to other projects. The facility has been supervised by the Carrington REC; salaries, operating and equipment are entirely grant supported. Stakeholders in the region have made commitments to providing support for the center; one commitment was a gift of 40 acres to increase the research footprint. State resources would be used for operating support. The facility conducts research on irrigated, high-value crops for the southeastern region of North Dakota.

Need: Operating - $600,000

3 Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness

Situation: Graduate student funding (Increase pool of funds for additional graduate research assistantships)
Graduate research assistantships are critical to ongoing, vibrant research programs. These students are hard-working, 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 carry out their individual research topics (all part of educating and training the next generation of scientists). 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 was provided 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 the state (23) or region (10). Because of the importance of agriculture in North Dakota, 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.

Need: Graduate Research Assistantships (20 @ $20,000/year) - $800,000

Situation: Operating Funds
The NDAES received $600,000 last biennium for precision agriculture research. These funds were used as a grants pool for research/Extension programs, with scientists in the AES and specialists in Extension eligible for funding. The call for proposals resulted in 25 proposals addressing issues in precision ag ranging from economics, crops issues (management, pest control) and livestock production to engineering. Of these proposals, which totaled $1.8 million in requests, nine were funded. Increasing the total funding available through the competitive program will allow more projects to be carried out in this important and rapidly changing area of agriculture. The activity and output of important programs such as the Soil Health Initiative, wheat improvement, pulse pathology and weed-resistance research could benefit from increased operating funds. Impacts on soil by the oil industry in western North Dakota have been reported. Many of these 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. The Center for Ag Policy and Trade Studies, which is the premier agricultural policy center in the region, evaluates state, domestic and international policies that affect demand-supply of grains and net farm income. Identifying ways to enhance operations support for all programs in the AES would address increased costs of materials, supplies and small equipment, and allow scientists to increase their scope of work.

Need: Operating support for precision ag - $600,000
- Soil Health Initiative - $80,000
- Wheat improvement - $80,000
- Pulse pathology - $50,000
- Weed resistance research - $50,000
- Land reclamation and soil restoration due to oil impacts - $80,000
- Center for Ag Policy and Trade Studies (CAPTS) - $80,000

2017-19 Program Initiatives as Ranked by SBARE (continued)

4 Enhancing Research Infrastructure at RECs

Situation: REC Operating support - Operating costs for research activities continue to increase. At the RECs, despite very high levels of funding obtained by scientists through grants, other costs, such as state motor pool costs, new project development, equipment repairs and supplies, and new issues facing the state's agricultural sector, continue to impact their ability to carry out their mission to serve their area of the state. A portion of the requested amount for increased operating funds for the RECs was authorized in the 2015-17 session and is greatly appreciated. This request is to provide the remainder of the requested amount.

Need: Operating funds (7 @ $30,000/biennium) - $210,000

Situation: The salary and fringe benefits of the director's position at the North Central Research Extension Center were paid equally by the center (AES) and Extension. Upon the retirement of the previous director, the Extension Service reduced its salary support to that (5 percent) for other REC directors. This results in a shortfall of salary and fringe benefits funds for the next director. The request is to stabilize the funding line for this important position.

Need: Stabilizing salary line (and fringe benefits) for NCREC director - $95,000

5 Enhancing Research Capacity in Plant Virology and Pulse Pathology

Situation: Virologist - North Dakota has a highly diverse crop agriculture sector, producing more than 40 crop commodities and leading the nation in the production of 15 commodities. Many of these crops are impacted by diseases caused by plant viruses. Also, recent reports of new (for this area) virus diseases have occurred. Cereals, pulse crops and other broad-leafed crops such as soybean, potato and sugar beet can have virus problems. Potato and pulses, in particular, have a number of virus diseases that are present in the state. Efforts to study the cause, spread and elimination of virus diseases at NDSU have been hampered by the lack of a dedicated virologist position that can focus on these unique diseases. Viruses can be spread by insect pests; increased numbers of insect vectors can spread the virus disease rapidly. Working with entomologists, geneticists and plant breeders, the virologist position will fill a critical void in reducing damage caused by disease.

Need: Scientist (1.0 FTE) - $355,000; Operating - $200,000; TOTAL - $555,000

Situation: Pulse Pathology Technical Support Staff - The Pulse Pathology program is responsible for carrying out research and finding solutions to disease problems affecting pulse crops. The program focuses on a wide range of diseases affecting dry edible bean, pea, lentil and chickpea. Each of these crops is affected by different diseases, and many diseases for each crop are of economic concern to growers in North Dakota. The wide breadth of this program is in need of additional technical support.

Need: Pulse Crop Technical Support (1.0 FTE, Main Station) - $180,000

6 Harnessing the Microbiome for Improved Plant, Animal and Soil Health

Situation: Microbiome Initiative (operating support) – The microbiome is the ecological community of organisms that can be beneficial (symbiotic), neutral (commensalistic) or antagonistic (pathogenic) to other organisms, including humans, animals and plants. Microbiome research is most advanced in humans – impacts on human health and phenotype have been reported widely – and the genomic interactions of microbes in the body and human DNA play a role in a wide number of phenotypic and human health-related issues, including diabetes, obesity and cardiac issues. Similarly, plants and animals have their respective microbiomes that affect health and productivity of the higher organism. Understanding the microbiome will aid in improved nutrition, and the disease and environmental impact of animal and crop production, ultimately benefitting human health. In addition, understanding the soil microbiome may allow for improving and maintaining soil health.

Need: Operating for improving microbiome in plant, animals, food and soils - $600,000

DETAILS:
2017-2019 Program Initiatives as Ranked by SBARE

North Dakota Agricultural Experiment Station

1. Restore Budget to 2015-2017 Original Appropriation

2. Oakes Irrigation Site

Operating **$600,000**

The Oakes Irrigation Site has been funded through the Garrison Conservancy District. This funding no longer will be available in the near future (as committed funding) due to reallocation to other projects. The facility has been supervised by the Carrington REC; salaries, operating and equipment are entirely grant supported. Stakeholders in the region have made commitments to providing support for the center; one commitment was a gift of 40 acres to increase the research footprint. State resources would be used for operating support. The facility conducts research on irrigated, high-value crops for the southeastern region of North Dakota.

3. Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness

Graduate research assistantships (20 @ $20,000/year) **$800,000**

Graduate student funding (Increase pool of funds for additional graduate research assistantships) — Graduate research assistantships are critical to ongoing, vibrant research programs. These students are hard-working, 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 carry out their individual research topics (all part of educating and training the next generation of scientists). 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 was provided 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 the state (23) or region (10). Because of the importance of agriculture in North Dakota, 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.

Operating support for precision ag	**$600,000**
Soil Health Initiative	$80,000
Wheat improvement	$80,000
Pulse pathology	$50,000
Weed resistance research	$50,000
Land reclamation and soil restoration due to oil impacts	$80,000
Center for Ag Policy and Trade Studies (CAPTS)	$80,000

Operating Funds — The NDAES received $600,000 last biennium for precision agriculture research. These funds were used as a grants pool for research/Extension programs, with scientists in the AES and specialists in Extension eligible for funding. The call for proposals resulted in 25 proposals addressing issues in precision ag ranging from economics, crops issues (management, pest control) and livestock production to engineering. Of these proposals, which

totaled $1.8 million in requests, nine were funded. Increasing the total funding available through the competitive program will allow more projects to be carried out in this important and rapidly changing area of agriculture. The activity and output of important programs such as the Soil Health Initiative, wheat improvement, pulse pathology and weed-resistance research could benefit from increased operating funds. Impacts on soil by the oil industry in western North Dakota have been reported. Many of these 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. The Center for Ag Policy and Trade Studies, which is the premier agricultural policy center in the region, evaluates state, domestic and international policies that affect demand-supply of grains and net farm income. Identifying ways to enhance operations support for all programs in the AES would address increased costs of materials, supplies and small equipment, and allow scientists to increase their scope of work.

4. Enhancing Research Infrastructure at RECs

Operating funds (7 @ $30,000/biennium) **$210,000**

REC Operating support — Operating costs for research activities continue to increase. At the RECs, despite very high levels of funding obtained by scientists through grants, other costs, such as state motor pool costs, new project development, equipment repairs and supplies, and new issues facing the state's agricultural sector, continue to impact their ability to carry out their mission to serve their area of the state. A portion of the requested amount for increased operating funds for the RECs was authorized in the 2015-17 session and is greatly appreciated. This request is to provide the remainder of the requested amount.

Stabilizing salary line (and fringe benefits) for NCREC director $95,000

The salary and fringe benefits of the director's position at the North Central Research Extension Center were paid equally by the center (AES) and Extension. Upon the retirement of the previous director, the Extension Service reduced its salary support to that (5 percent) for other REC directors. This results in a shortfall of salary and fringe benefits funds for the next director. The request is to stabilize the funding line for this important position.

5. Enhancing Research Capacity in Plant Virology and Pulse Pathology

1.0 FTE Virologist	**$355,000**
Operating	**$200,000**
Total	$555,000

Virologist — North Dakota has a highly diverse crop agriculture sector, producing more than 40 crop commodities and leading the nation in the production of 15 commodities. Many of these crops are impacted by diseases caused by plant viruses. Also, recent reports of new (for this area) virus diseases have occurred. Cereals, pulse crops and other broad-leafed crops such as soybean, potato and sugar beet can have virus problems. Potato and pulses, in particular, have a number of virus diseases that are present in the state. Efforts to study the cause, spread and elimination of virus diseases at NDSU have been hampered by the lack of a dedicated virologist position that can focus on these unique diseases. Viruses can be spread by insect pests; increased numbers of insect vectors can spread the virus disease rapidly. Working with entomologists, geneticists and plant breeders, the virologist position will fill a critical void in reducing damage caused by disease.

1.0 FTE Pulse pathology technical support staff $180,000

Pulse Pathology Technical Support Staff — The Pulse Pathology program is responsible for carrying out research and finding solutions to disease problems affecting pulse crops. The program focuses on a wide range of diseases affecting dry edible bean, pea, lentil and chickpea. Each of these crops is affected by different diseases, and many diseases for each crop are of economic concern to growers in North Dakota. The wide breadth of this program is in need of additional technical support.

6. Harnessing the Microbiome for Improved Plant, Animal and Soil Health

Operating **$600,000**

The microbiome is the ecological community of organisms that can be beneficial (symbiotic), neutral (commensalistic) or antagonistic (pathogenic) to other organisms, including humans, animals and plants. Microbiome research is most advanced in humans – impacts on human health and phenotype have been reported widely – and the genomic interactions of microbes in the body and human DNA play a role in a wide number of phenotypic and human health-related issues, including diabetes, obesity and cardiac issues. Similarly, plants and animals have their respective microbiomes that affect health and productivity of the higher organism. Understanding the microbiome will aid in improved nutrition, and the disease and environmental impact of animal and crop production, ultimately benefitting human health. In addition, understanding the soil microbiome may allow for improving and maintaining soil health.

North Dakota Agricultural Experiment Station
Main Research Station

2015-2017 IMPACTS

- Artificial insemination (AI) offers beef producers the potential to make genetic progress within their herd at a fraction of the cost it would require to purchase herd bulls of equivalent genetic value. Research conducted by NDAES scientists indicates that the value of replacement heifers can be increased by over $500 per head through the use of artificial insemination. If an additional 10% of the 375,000 replacement heifers maintained in North Dakota were generated from AI breeding, the net increase in their value would be over $18 million annually.
- Research efforts on the nutrient requirements for beef cattle have impacts on production and economic efficiencies for all beef cattle in North Dakota. The product of this NDAES research was the text, '2016 Nutrient Requirements of Beef Cattle'. This text is utilized around the world by livestock producers, nutritionists, and scientists to more accurately formulate beef cattle diets. Conservative estimates in North Dakota indicate that a 5% improvement in feed efficiency by using more precise nutrient recommendations could save North Dakota beef cattle producers over $25 million in feed costs annually.
- Research related to the interactions between reproduction and nutrition, and research concerning regulation of ovarian, uterine, and placental functions in non-pregnant and pregnant domestic animals, have identified selected mechanisms critical for reproductive efficiency that may ultimately improve fertility and embryo survival. A 1% increase in pregnancy rate in North Dakota livestock would potentially result in more than $10 million in increased revenue for North Dakota ranchers annually.
- North Dakota currently operates with four active mines which produce approximately 32 million tons of coal annually. Reclamation is required on nearly 2,000 acres of land each year to begin the 10-year bond release process. NDAES scientists are working with industry to improve both reclamation practices using native plant species and efficiencies, as well as reduce soil compaction. The average cost to reclaim is $60,000/ac. or $120 million per year.
- Soil health is of primary concern for farmers and ranchers in the state. Salinity or sodicity may affect nearly 25% of North Dakota's soils to some degree. Nearly 2 million acres in the Red River Valley are impacted by salt contents that reduce yields significantly. NDAES scientists, in collaboration with Extension and many commodity groups, are identifying ways to reduce the negative impacts of salinity and sodicity in our northern Plains production area. These programs have helped producers adopt management practices that help improve long-term soil productivity, such as managing soil salinity.

NDAES scientists, in collaboration with Extension and many commodity groups, are identifying ways to reduce the negative impacts of salinity and sodicity in our northern Plains production area.

- Fertilizer is one of the highest input costs that farmers require each year. Proper use and application is critical to ensure maximum yield while maintaining the environment. NDAES scientists are identifying methods to optimize nutrient use efficiencies for various commodities (e.g. wheat, corn, sugarbeet, specialty crops, wheat, soybeans) for our extreme northern production system. Based on fertilizer tonnage sales in ND, it is estimated that improving fertilizer efficiency by just 5% would save ND farmers $25 million annually.
- Cooperative work with wheat, barley, soybean, potato, and other breeding programs at NDSU has resulted in the development of disease-resistant germplasm and varieties for North Dakota. The genetic resistance in accepted cultivars grown on wide acreage saves producers tens to hundreds of millions of dollars in disease losses and in fungicide applications each year.

Cooperative work with wheat, barley, soybean, potato, and other breeding programs at NDSU has resulted in the development of disease-resistant germplasm and varieties for North Dakota.

- For crops or situations where fungicides are a necessary disease management tool, our research helps determine optimum timing for and rates of fungicide applications and helps identify new fungicide chemistries to control diseases. This work also assists North Dakota in obtaining Section 18 emergency exemptions that increases fungicide options for producers. Proper and judicial use of fungicides has saved 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.
- NDAES microbiologists are helping producers to meet requirements of the Food Safety Modernization Act (FSMA). As an example, FSMA requires flaxseed processors to implement controls to reduce the levels of microbial pathogens. Research has shown that treatment with steam at sub-atmospheric pressures reduces the numbers of bacterial pathogens on flaxseed without affecting product quality, and can therefore be used by producers to help meet FSMA requirements. North Dakota produces 95% of the U.S. flaxseed with an estimated value of between $50 and $80 million.
- The use of legume cover crops planted after wheat reduces the need for nitrogen (N) fertilization in corn following in the rotation by 100 lbs N/acre/year. With an N credit of only 50 lbs N/acre, the economic value of reducing the fertilization of the 2.66 million acres of corn in North Dakota is $39.8 million per year.
- NDAES agronomists found that canola grown in narrower row widths generated higher grow revenue per acre (nearly $100/acre) than when grown in conventional row widths. If applied to all acres of canola sown in North Dakota (1,400,000 acres in 2015), the economic impact of proper row spacing would be $140 million.
- Research carried out on herbicide-resistant weeds identified genes and mutations responsible for resistance. Based on their results, NDAES scientists have identified strategies to minimize the occurrence of herbicide-resistant weeds, which are estimated to cost $10 to $40 more per acre to control than non-resistant weeds.

- Leafy spurge has been reduced from 1.5 million to less than 800,000 acres due to research carried out by the NDAES. The annual savings to the state from reduced leafy spurge infestation is estimated to be $13.9 million in direct costs including increased grazing land for cattle, increased hay production and decreased negative environmental impact.
- On average North Dakota produces over 60% of the durum in the United States and over 90% of the ND durum acreage is sown with varieties developed by the NDAES durum wheat breeding program. Varieties developed by this program generate over $400 million directly to producers annually. Carpio and Joppa, two new varieties developed by the NDAES durum breeding program are quickly being adopted by producers and have high yield and excellent quality potential.
- In 2015, 53% North Dakota's spring wheat acreage was sown to varieties developed by the NDAES. According to NDAES Ag Economist Dr. William Wilson, a variety released from the NDSU spring wheat breeding program has an estimated economic impact to the state ranging from $69 to $284 million over the period it remains in the marketplace, when compared to other competitive varieties.
- Based on a 2015 survey done by the American Malting Barley Association on barley varieties grown in North Dakota, about 50% of the North Dakota acres sown to two-rowed barley were done so with varieties developed by the NDAES. Changes in the malting and brewing industries in the US are resulting in an increased demand for two-rowed barley. In 2015, approximately 25% of North Dakota's 1.12 million barley acres were sown to two-rowed barley. Assuming 50% of these acres were sown with NDAES varieties and a $0.25 per bushel premium for two-rowed barley over six-rowed barley, growers across the state realized an additional $2.24 million in revenue from growing NDAES-developed two-rowed varieties.
- North Dakota is the leading producer of dry beans in the U.S. Based on the grower surveys in the MIN-DAK region from the last three years (2013-2015), approximately 90% of the black bean acreage, 10% of the navy bean acreage, and 30% of the pinto bean acreage is sown with varieties developed by the NDAES dry bean breeding program. Assuming an average grower price of $0.35/lb across the different market classes, these varieties contributed approximately $93 million per year to the state's economy during the last three years. This means that theoretically, for every dollar invested in the dry bean breeding program, there is an approximate return of $375 each year.

NDAES Ag Engineers provided statewide leadership in applied research and education on UAS application in agriculture

- NDAES Ag Engineers provided statewide leadership in applied research and education on UAS application in agriculture by bringing industries from across the country and around the world to North Dakota on economic development projects where industry investment amounted to many million dollars. The NDAES is working with state departments, the economic development commission, industries, farmers and rural cooperatives to address the precision agriculture needs of the state and to bring economic prosperity.
- An NDAES Ag Engineer is determining drawbar power requirements for chisel plowing under different calcium-based surface amendments. Subsurface drainage practices on sodic soil will help establish best management practices for soil surface amendments and drainage for improving soil health in sodic soils. Over 18,000,000 acres of saline/sodic soils in North and South Dakota may be at risk of conversion to sodic soils due to resumption/initiation of tillage and installation of subsurface drainage, and could benefit from this research.

- NDAES research on livestock manure and waste management helps develop new knowledge to develop and implement best management practices to mitigate environmental concerns from livestock facilities. NDAES researchers were instrumental in helping producers with bird flu incidence to put down and compost the birds to avoid further spread the disease.

NDAES research on livestock manure and waste management helps develop new knowledge to develop and implement best management practices to mitigate environmental concerns from livestock facilities.

- Technology in agriculture is changing very rapidly and it is essential to partner with technology developers and end-users. The reason is simply to be assured that the state-of-the-art technology is accessible to North Dakota growers. NDAES researchers are working as a multi-disciplinary team to identify and create technology partnerships. Two commercial partnerships have been created, and there are three that are near fruition, in addition to a research/educational partnership. The partnerships with technology providers and major end-users involves joint research, simultaneous access to technology, and funding.

- NDAES researchers are studying the use of optical sensing data collected via unmanned aerial systems for the detection and management of crop stress, such as nutrient deficiency and disease of several major crops grown in North Dakota. Other researchers are measuring the adoption rates of precision agriculture technologies, especially the adoption of automatic section control (including row control) for planting and spraying, in different regions of the state. It is envisaged that this technology could substantially improve input use efficiency for farmers with the irregular field shapes and large numbers of in-field obstacles typical of the Prairie Pothole Region.
- The Center for Agricultural Policy and Trade Studies is completing research on evaluating the importance of commodity programs, the conservation reserve program, and crop insurance on farm income, efficiency, and productivity for the new Farm Bill. The Center also is evaluating the importance of the structure of farm programs on agriculture production functions and efficiency using farm level Agricultural Resource Management Survey (ARMS) data.

North Dakota Agricultural Experiment Station
Main Research Station

Precision Ag Initiative Impacts Report

Approved projects

1. Delineation of Chlorosis in Soybean Fields Using Unmanned Aerial Systems; PI:John Nowatzki, Agricultural and Biosystems Engineering
2. Drone-based Remote Sensing to Predict Sugarbeet in Season Nitrogen Demand and Yield; PI:Amitava Chatterjee, SNRS — Soil Sciences
3. Identification and Mapping of Resistant Weeds and Herbicide Drift Injury with High Resolution UAS Images; PI:Sreekala Bajwa, Agricultural and Biosystems Engineering
4. Increasing UAV Related Research Capacity at the Carrington Research Extension Center; PI:Paulo Flores, Carrington Research Extension Center
5. Optimizing Barley Quality Across a pH and Organic Matter Gradient; PI:Mike Ostlie, Carrington Research Extension Center
6. Precision Application of Herbicides for Sustainable Crop Systems; PI:Kirk Howatt, Plant Sciences
7. Use of Electronic Monitoring Systems for Precision Management of Cow/Calf and Cattle Feeding Enterprises; PI:Carl Dahlen, Animal Sciences
8. Using Crop Growth Models to Incorporate Temporal Variability into Precision Farming; PI:Joel Ransom, Plant Sciences
9. Whole-farm Analysis of the Decision to Invest in Automatic Section and Row Control Tech for planting and spraying in ND; PI:David C. Roberts, Agribusiness and Applied Economics

Preliminary Results

- Preliminary research indicates that efforts to control spray drift through the use of pulse-width modulation sprayers may result in less effective weed control than spraying with more conventional droplet sizes.
- Interest in Unmanned Arial Systems (UAS) is growing rapidly. Preliminary research conducted at the Carrington REC indicates that UAS technology can be used to predict soybean relative maturity and to assess the level of leaf disease on barley.
- Research conducted by the NDSU Agricultural and Biosystems Engineering Department indicates that UAS technology may be a useful tool for estimating the prevalence of herbicide resistant weeds and potentially allow for earlier detection of weed infestations.
- NDSU research using UAS to measure iron deficiency chlorosis may lead to better systems of matching varietal selection to field conditions for improvement of overall yield response in soybean fields.

North Dakota Agricultural Experiment Station
Main Research Station

Souris River Research Report

Current research on the Souris River flood impacts project builds on the work accomplished in Phase I. Soil, vegetation and seed bank analysis revealed differences among sampling locations. However, differences were not consistent with macro-scale elevations and distances from the river. Given that, we have broken down the current investigations into two components::

1. Subtle topographical differences in the landscape create micro watersheds that effectively holding water for different times. To determine where these locations are on the landscape we are using DEM (digital elevation models) and LIDAR (light detection and ranging) maps to overlay soil and vegetation data with more accurate elevations. With this we can identify basin and sinks to determine flood duration and better utilize the existing soil chemistry and vegetation from the previous project. Thus far, we have downloaded the appropriate data layers and started to overlay existing data within ArcGIS.
2. Following the initial flooding, the majority of exiting vegetation was killed by extended ponded water. After flood waters receded, much of the subsequent standing vegetation and seed bank was exotic grass and yellow sweet clover. Greenhouse trials revealed that as yellow sweet clover (a biennial) dies, nitrogen is released into the soil (Figure 1). Kentucky bluegrass was able to uptake the available nitrogen more readily than native plants which evolved under limited, rather than excess soil nitrogen (Figures 2 and 3). Understanding the vegetation dynamics existing after flood events can help predict where management actions will be required. Further, when combined with regional elevation and soils maps, vegetation data enables us to make tailored restoration/recovery recommendations to the broader region.

Figure 1

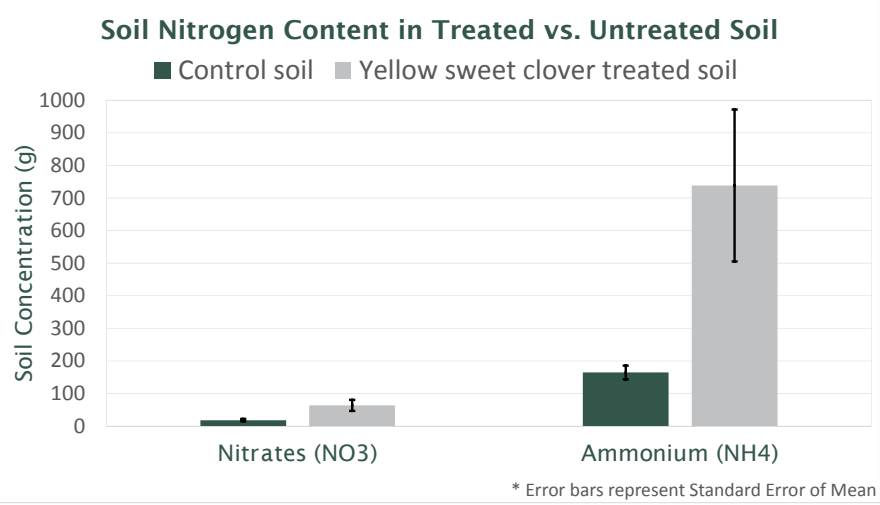


Figure 2

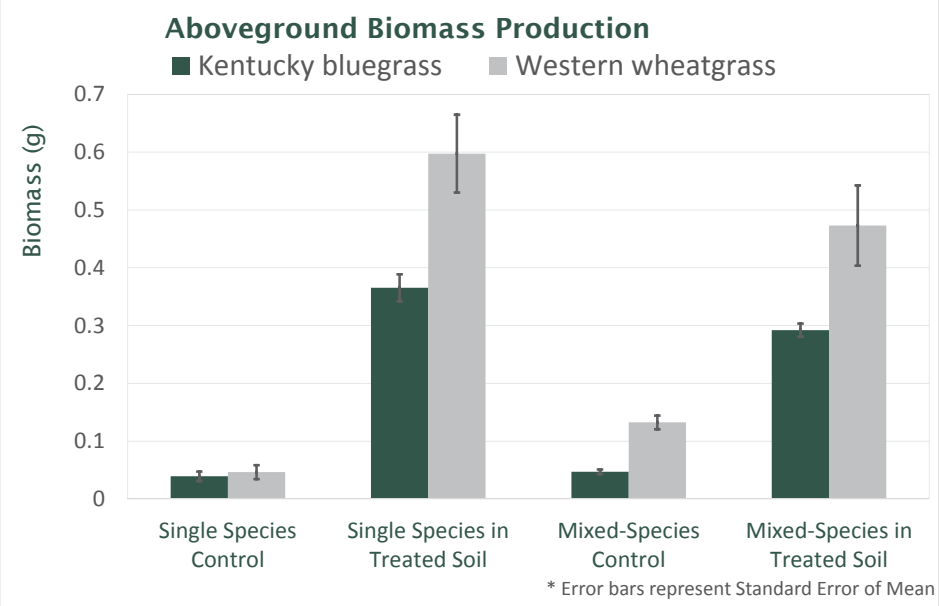
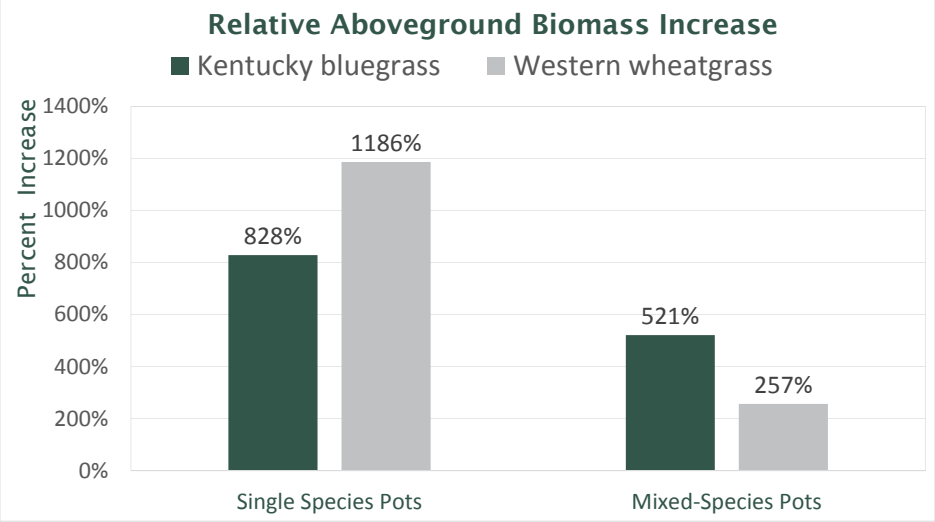


Figure 3



NDAES
Branch Research Centers

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 (CREC) was established in 1960. CREC operates on a land base of around 1,940 acres where the majority of acreage is managed as traditional dryland and is utilized primarily for field crop research activities and foundation seed production. CREC has infrastructure to irrigate about 270 acres with center-pivot systems and to mist or micro-irrigate 55 acres with hand-set systems.

The research effort at the CREC focuses on these general program areas: traditional crop variety evaluation, crop production and management, plant disease management, crop fertility and soil management, cropping systems, alternative crop development, beef cattle nutrition, intensive cow/calf production, feedlot management, integration of crop and livestock production, livestock waste and nutrient management, irrigation, northern hardy fruit production, and foundation seedstocks production. Through these efforts, the CREC research program has gained a national reputation for its ability to investigate a broad base of agricultural challenges that benefit both producers and the agriculture based businesses that support them.

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, livestock, plant pathology, 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 June 27, 2016. 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. The Carrington REC operates on a land base of around 1,940 acres with the state owning around 840 acres. The 1,100 acres not secured by state ownership must be sourced by 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.
- The 2015 ND Legislative Assembly provided $750,000 from the general fund for a seed cleaning plant at the CREC and an additional $1,500,000 of authorization. The CREC is using the appropriation to purchase the primary conditioning equipment (e.g. air screen, indent, gravity table and spiral separator) and other funds to construct a basic building to house this equipment. Additional funding will be required to complete the integration of the equipment to make it a functional seed conditioning facility.
- The beef research unit needs a multi-use 'feedlot research support facility'. This facility would expand the scope of research capabilities, assist in sustaining IACUC compliance, address worker protection challenges, and reduce maintenance costs for equipment. An associated need for this program is an additional set of feedlot pens that would include a subset placed within a hoop structure. 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 with regulations.
- 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.
- The programs of the CREC are supported by a diversity of facilities that include not only the primary buildings like headquarters and laboratory but also feedlot pens, feed and seed storage, animal shelters, water supply features, storage buildings, parking lots, roadways and waste containment. Current support for maintenance of these facilities is fully inadequate to address the current deferred maintenance costs.

Carrington Research Extension Center

2015-2017 IMPACTS

- Established UAV flight capacity to assess producer applications of this new technology for management of weed, fertility, disease and cultural issues.
- Conditioned and sold foundation grade seed of 29 varieties and nine crops to a diversity of seedsman.
- Evaluated the use of corn ethanol co-products as sources of phosphorus for crop nutrition.
- Provided producers with data to quantify their cattle performance in the feedlot with the Dakota Feeder Calf Show Feedout and the North Dakota Angus University.
- Trained producers and crop consultants in weed identification, nitrogen application techniques, soybean management and more resulting in an estimated value to participants of $10/acre.
- Provided data on summer confinement beef cow production to producers throughout the Midwest.
- Improved Sclerotinia disease control and soybean yield by delaying fungicide application to the R2 growth stage.

The CREC trained producers and crop consultants in weed identification, nitrogen application techniques, soybean management and more resulting in an estimated value to participants of $10/acre.

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 Central Grasslands Research Extension Center (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.

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 June 27, 2016. 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

- Livestock facilities continue to be deficient and impede potential research. 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.
- Significant improvements or replacement of the director's residence is needed as the current residence has water, mold, and foundational issues in the basement.
- Deferred maintenance and other repairs that affect both safety and use of facilities continue to be a critical issues.

Central Grasslands Research Extension Center - Streeter

2015-2017 IMPACTS

- Continued research on control of invasive grass species through early intensive grazing study and prescribed burning.
- Concluded 26 year grazing project evaluating the impacts of stocking rate on plant species composition.
- Expanded winter grazing research to include grazing of corn residues, cover crops, and bale grazing projects.
- Conducted research exploring the impacts of stocking rate and advancing season of forage intake of grazing beef cattle.
- Continued to expand on collaborative research efforts evaluating the impacts of management on reproductive performance of beef cattle.
- Hosted first annual Winter Grazing Workshop in collaboration with NDSU Extension Service.

The CGREC conducted research exploring the impacts of stocking rate and advancing season of forage intake of grazing beef cattle.

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 (DREC) has an established record of service to the people in the 13-county region south and west of the Missouri River. The DREC operates 6,506 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 Extension 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 June 27, 2016. 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

- Sustainable and Integrated Beef Systems — Expandable, hopefully, more sustainable systems need to be evaluated to assess current trends. In the future, all avenues for additional compensation need to be explored, to enhance the economic viability for beef producers and the rural areas associated with beef production. This compensation may come from not only beef but synergistic crop production. For example, small grain production systems that integrate rotational cropping practices, high residue management and annual forages, with attention to wildlife habitat enhancement, could be used to diversify income while opening the door to other value-added opportunities for beef production in concert with crop production.

  The Dickinson Research Extension Center, as part of North Dakota State University, takes serious the need for sustainable beef systems. Currently, the Center is striving to develop sustainable and integrated production strategies that match conditions of western North Dakota and surrounding regions. The inclusion of forages into traditional cropping systems can provide the resources necessary for the development of integrated production strategies that increase sustainability and profitability.

  There is a need to develop agro-ecosystems that optimize the balance between forage-based and grain-based crop/livestock systems reflective of the many individual ecosystems. These integrated systems must be synergistic to, or enhance the native and agronomic plant communities, thus providing the base for future beef production. In addition, enhanced value for commodities produced from forage-based systems is key. As the general population requires protein, a need met by meat and high protein crops, meeting this demand is a unique opportunity that a forage based system integrated with crop production can respond to, in addition to current crop land use. These thoughts are changing how the Dickinson Research Extension Center addresses the future.

  Previous work has certainly set baseline production for high residue cropping systems, grassland systems and livestock systems. However further definition, integration and refinement of these system efforts is critical. Beef production needs to think outside the box and the Center also needs to do the same. Challenging the limits of conventional thinking by linking the components of agricultural management systems with value added opportunities ensuring long term sustainability of beef and cropping systems within the environment is critical. In response, a new approach needs to be embraced, a concept of integrated agricultural systems that truly entwines crop, beef and forage production as a working unit for betterment of all.

- 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.

- Soil reclamation and dust issues in western ND — Soil disturbance and dust created by the extensive truck traffic servicing the oil industry in western ND has led to a number of potential soil reclamation, cropping and livestock issues. Subsequent productivity of disturbed soil, establishment of cropping systems following disturbance and the reduction of dust is critical. Production impacts may include reduced yields for both crop and forage production. The result is that soil disturbance and 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 soil and the agricultural industry in this region of the state.

Dickinson Research Extension Center

2015-2017 IMPACTS

- Continued work in agronomic, beef and range agricultural practices and developed managerial options reported in the Center's annual report located on the Center's web page https://www.ag.ndsu.edu/DickinsonREC.
- Continued and expanded work regarding soil disturbance and dust created by the extensive truck traffic servicing the oil industry in western ND.
- 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.

The Dickinson Research Extension Center continues work on integrated crop and livestock systems research.

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 Hettinger Research Extesnion Center (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 agricultural research programs. Research at HREC involves the disciplines of animal science, range science, wildlife science, agronomy, and weed science. The HREC conducts research in both sheep and cattle production and management systems, serving as the only REC in the ND Agricultural Experiment Station system with sheep. Livestock research is focused on feedlot nutrition and management, as well as enhancing reproductive efficiency in ruminants. Additionally, the HREC is located in a region where much of the land base is in the Conservation Reserve Program or has been recently removed from it, 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 while enhancing livestock grazing opportunities. Agronomic and Weed Science research is focused on conducting variety and weed control trials in a no-till, semi-arid production system that is prone to drought. 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 June 27, 2016. 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

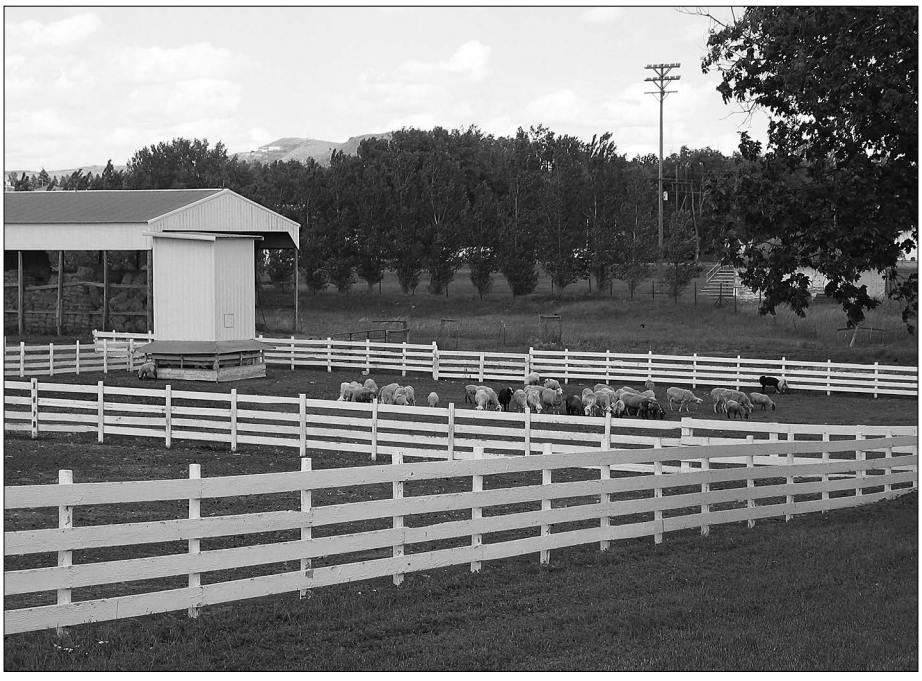
Agency Future Critical Issues

- Technical support for the livestock research program is dependent on restoration of the base budget. This position is needed to meet the research needs of producers in SW North Dakota.
- A modern livestock processing and research support facility is needed to enhance both quality and quantity of research by our sheep and cattle research programs. The current facility is a 16' x 32' lean-to, with no ability to utilize today's 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 graduate students and technicians is needed for a nationally competitive program, and 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 past wet cycles and heavier than normal traffic, the road to the office is unstable and needs to be replaced. The most recent inspection by the Fire Marshall indicated that the 1970's-era bunkhouse needs to be renovated to maintain its use as a housing facility, due to fire and safety concerns. Additional needs include mechanical system renovation of the 1992 office, and parking lot re-paving.

Hettinger Research Extension Center

2015-2017 IMPACTS

- Evaluated new varieties and technologies to grow drought tolerant crops and new and emerging bio-fuels.
- Conducted multiple land use research evaluating: the nest ecology of an indicator species (sharp-tailed grouse) on National Grasslands, grazing strategies to complement pheasant habitat concerns, and native prairie restoration techniques on less productive 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 nutrition.
- Established a new Weed Science research program to evaluate weed control in dryland no-till cropping systems and control of invasive weeds of pasture and rangeland.
- Established a new Livestock Extension program.
- Completed the 8,000 sq. ft. Agronomy and Range Research Laboratory funded the previous biennium.



The HREC conducts a nationally recognized sheep research program evaluating alternative technologies for increasing reproductive efficiency in both males and females and feedlot nutrition.

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 549 owned acres and an additional 206 acres under lease agreement. The LREC serves a nine-county region located in northeast North Dakota. It has North Dakota's highest precipitation rates, coolest temperatures, and richest productive soils. The climate supports 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 since 1909. 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 information regarding disease minimizing cultural farming practices and trusted information regarding chemical applications and other inputs that minimize disease and insect pressures that give growers the best return on investment.

Recently, the LREC has significantly enhanced its overall agricultural research programming with an increase in the foundation seed stocks program, the addition of a crop protection scientist, farm business management instructor, Extension specialist in agronomy and an Extension specialist in soil health. New infrastructure additions in the past 12 years include a full service agricultural based learning center/headquarters building constructed in 2004, agronomy/pathology laboratory in 2015 and a 25 acre field tiling project completed in 2014. The NDSU LREC with its recent personnel and infrastructure additions and improvements will insure that growers can depend on research data that will improve their bottom line for the next 100 years.

Agency Mission Statement

The Langdon Research Extension Center will conduct applied agricultural research that enhances the quality of life for the region's 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 region's 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 June 27, 2016. 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 number one issue currently for the NDSU Langdon Research Extension Center is to maintain a level budget through the 2017/19 biennium based on the 2015/17 budget. This is needed to support the research and extension programming that has grown based on growers needs the past several years.
- In 1962, a seed cleaning plant was constructed at Langdon to provide local seedsmen and producers the ability to purchase and grow the highest quality seed available (foundation grade seed). The region's seedsmen 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.

Langdon Research Extension Center

2015-2017 IMPACTS

- Continue to build and foster strong research and extension partnerships with commodity groups, regional crop improvement associations, area growers, and others associated with the ag industry in ND. These partnerships allow us to identify and address critical production issues as quickly as possible to protect growers' investment in their operations.
- Produced and distributed NDSU varieties of foundation grade seed of the major crops grown in our region. Our region is the number one producing region of HRSW in ND and 50 percent of the HRSW grown here is an NDSU variety originating from the NDSU foundation seed stocks program.
- Concluded successful negotiations with an absentee landowner to purchase 160 acres of crop land adjacent to Langdon REC land for research and extension purposes at fair market value. The state provided $175,000 of the funding and the other $175,000 was raised locally.
- 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 Specialists outreach programs in agronomy and soil health that fills a vital educational need for growers in our region. They have also been very helpful mentoring several new extension agent hires recently in our region.

Center staff produced and distributed NDSU varieties of foundation grade seed of the major crops grown in our region.

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 North Central Research Extension Center (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 June 27, 2016. 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

- Increased base funding to support research and extension efforts
- Additional technical support
- Increased operating funds
- Equipment replacement
- Removal of old seedhouse
- Drain tile NCREC yard
- Encroachment from city of Minot
- Sale and purchase of additional land for seed production

North Central Research Extension Center - Minot

2015-2017 IMPACTS

- Produced, conditioned, and distributed foundation seed of nine crops grown in the region consisting of 24 unique varieties.
- Assisted in development of new varieties of economically important crops and evaluated production strategies for alternative crops such as carinata, fava bean, and energy beets.
- Researched crop production products in order to improve efficiencies and maximize economic return for minor and major acreage crops grown in ND.
- Provided extension education in the areas of livestock, soil health, crop protection, and cropping systems.
- Conducted residue trials with the USDA IR-4 program that lead to registration of new pesticides to control weeds, diseases, and insects in minor acreage crops important to ND agriculture.

Center staff assisted in development of new varieties of economically important crops and evaluated production strategies for alternative crops such as fava bean.

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 (WREC), 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. In 2012 an additional 1,100 acres of land were leased from the North Dakota Game and Fish Department for pure seed production and dryland research. WREC research studies are conducted on crop variety evaluation, herbicide performance and other cultural management research, plant disease control and management research in cropping systems, soil and water conservation practices, pipeline reclamation, and horticulture.

WREC research is intended to increase the producer's net profit, support crop diversification and encourage more intensive cropping and irrigation development. Research on soil and crop management 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 safflower, winter wheat, and durum and variety evaluations in cooperation with NDSU Main Station scientists. WREC produces and supplies foundation seed to area farmers of new and old varieties adapted to the region.

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 at the USDA-ARS Northern Plains Agricultural Research Laboratory in Sidney, Montana and other cooperating 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 June 27, 2016. 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

- Increasing operating costs and higher labor costs for research activities continue to impact WREC abilities to carry out our research programs vital to the improvement of the economic and environmental performance of our agricultural lands. A high priority need is the request to restore the 2015-2017 WREC budget to the 100% funding level. Deferred maintenance funding also continues to be an important need for WREC to maintain its facilities.
- The switch from a strict small grain-fallow rotation to a more intensive no-till diversified cropping system has resulted in northwest North Dakota farmers growing more than 20 different crops on over an additional million acres of previously fallowed land increasing the demand for pure seed of varieties of pulse crops and other fragile specialty seeds. The WREC seed conditioning plant built in 1954 is antiquated and was designed to only handle cereal crops and does not have the capability of cleaning peas, lentils, chickpeas, and other fragile seeds that are in high demand by our farmers. The outdated seed conditioning plant also poses considerable safety issues. A horizontal seed conditioning plant with optical color sorter and higher bushel per hour capacity is needed to allow WREC to condition Foundation seed of a wide array of new crop varieties to provide pure seed to growers.
- An additional equipment storage building is needed for WREC farm and plot research equipment to allow all WREC high cost farm and research equipment to be stored indoors from the elements.
- A greenhouse is needed for the new WREC Plant Pathology Program and the Horticulture Program to allow these programs to conduct plant disease and horticulture research during the winter months.
- Increased state operating costs due to state fleet rate/policy change.

Williston Research Extension Center

2015-2017 IMPACTS

- Continued a multi-disciplinary team long term dryland cropping system research project to evaluate and develop diversified cropping systems recommendations for improving soil health, water use efficiency, crop performance, and economic and environmental sustainability.
- The WREC Foundation Seed Program in 2015 produced over 50,000 bushels of Foundation seed of 21 varieties of small grains and broadleaf crops as a result of an acquired lease of 1,184 acres from the North Dakota Game and Fish Department that increased the WREC land base for Foundation seed program.
- New plant pathologist research program assembled a WREC plant pathology laboratory, established collaborations with USDA-ARS, Hettinger Research Extension Center, and NDSU Plant Pathologists, initiated plant pathology investigations on peas, lentils, durum, barley, and sugarbeets and obtained grant funding for a pulse crop pest scout to serve northwest North Dakota.
- WREC has developed and utilized a 160-acre irrigated site in its tenth year of research to identify improved irrigated cropping systems, tillage systems, and best management practices to improve water use efficiency, soil health, crop management systems, and economic and environmental sustainability.
- Evaluated the performance and adaption of new and established dryland and irrigated crop cultivars and crop cultural practices to improve productivity of agricultural products.
- Initiated a new long-term pipeline reclamation research project on WREC land to assess the economic impact of the disturbed soils on crop performance and to demonstrate reclamation treatments to restore crop yields and soil health.
- Horticultural program initiated high tunnel research with vegetable crops and cut flowers.
- Organized and assisted with outreach programming opportunities in the region: National Hard Red Spring Wheat Show, Irrigation Workshop, Pulse Days, offstation trials and tours, field day events, and MonDak Ag Showcase.
- Established a new reclamation research and demonstration project to reclaim a saline seep area on WREC land in collaboration with the Montana Salinity Control Association.

The WREC Foundation Seed Program in 2015 produced over 50,000 bushels of foundation seed of 21 varieties of small grains and broadleaf crops.

NDAES
Agronomy Seed Farm

Agency Overview

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 June 27, 2016. 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

2015-2017 IMPACTS

- Produced 35,000 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 main purpose is to increase seed of new varieties as they are developed by the plant breeding and supporting departments of the NDAES.

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2017-19 Capital Improvement and One-time Requests as Ranked by SBARE

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

(Priority No. 2 capital improvement request in 2013-15 and No. 3 in 2015-17 request)

Seed cleaning facilities at the CREC, LREC, NCREC and WREC need to be replaced. Current facilities are antiquated, lack reliable capability to ensure high-quality seed, and are slow and inefficient. Current 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. These facilities pose considerable worker safety issues. Partial funding ($1,500,000) was received to purchase equipment for the Carrington and North Central REC seed cleaning plants, along with authorization to raise $3,000,000 in other funds for building construction. Difficulties in the farm economy reduce the opportunities to raise funds for building construction. No funding was received for the Williston or Langdon REC. - $3,750,000

2. Animal Science Meats Research Facility – Main Station

(Priority No. 2 capital improvement request in 2015-17)

A new/upgraded facility is needed urgently. The current Meats Lab was built in the 1950s 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. - $7,600,000

3. Agronomic, Pathology and Soils Field Lab Facility

(Waldron Hall replacement)

Waldron Hall was built in the mid-1950s to house the field laboratories for the wheat breeding programs in the Department of Agronomy. An addition was built in the mid-1960s to house approximately another 16 scientists from the Departments of Agronomy and Plant Pathology. The building now houses field labs and wet labs for nearly 40 scientists at the Main Station involving a number of disciplines. Many of these labs are shared, and the seed drying, cleaning and storage facilities needed by our scientists are grossly insufficient and a health hazard to anyone working in the facility. A new facility is needed to provide our scientists with a safe environment to conduct their research, as well as process, clean and store seed. - $39,000,000

4. 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. Various and ongoing issues exist at the Main Station and all RECs, primarily with respect to facility updates and repairs. - $1,440,465

5. Equipment Storage Sheds

Expensive purchased and/or leased field equipment is an investment that the AES needs to protect. Storing expensive research plot equipment, such as tractors, seeders and combines, outdoors reduces the life of the machines and can compromise the sophisticated electronics typically used on equipment. - 8 @ $306,250 = $2,450,000

One-time Requests:

1. **Utility Costs of Main Station AES Greenhouse** - $400,000
2. **Assessments for Road Improvement** - TBD

DETAILS:
2017-2019 Capital Improvement and One-time Requests as Ranked by SBARE

ND Agricultural Experiment Station

1. Seed Cleaning Facilities **$3,750,000**

(Priority No. 2 capital improvement request in 2013-15 and No. 3 in 2015-17 request)

Seed cleaning facilities at the CREC, LREC, NCREC and WREC need to be replaced. Current facilities are antiquated, lack reliable capability to ensure high-quality seed, and are slow and inefficient. Current 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. These facilities pose considerable worker safety issues. Partial funding ($1,500,000) was received to purchase equipment for the Carrington and North Central REC seed cleaning plants, along with authorization to raise $3,000,000 in other funds for building construction. Difficulties in the farm economy reduce the opportunities to raise funds for building construction. No funding was received for the Williston or Langdon REC.

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A new/upgraded facility is needed urgently. The current Meats Lab was built in the 1950s 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.

3. Agronomic, Pathology and Soils Field Lab Facility **$39,000,000**

(Waldron Hall replacement)

Waldron Hall was built in the mid-1950s to house the field laboratories for the wheat breeding programs in the Department of Agronomy. An addition was built in the mid-1960s to house approximately another 16 scientists from the Departments of Agronomy and Plant Pathology. The building now houses field labs and wet labs for nearly 40 scientists at the Main Station involving a number of disciplines. Many of these labs are shared, and the seed drying, cleaning and storage facilities needed by our scientists are grossly insufficient and a health hazard to anyone working in the facility. A new facility is needed to provide our scientists with a safe environment to conduct their research, as well as process, clean and store seed.

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5. Equipment Storage Sheds

8 @ $306,250 **= $2,450,000**

Expensive purchased and/or leased field equipment is an investment that the AES needs to protect. Storing expensive research plot equipment, such as tractors, seeders and combines, outdoors reduces the life of the machines and can compromise the sophisticated electronics typically used on equipment.

One-time Funding Requests

1. Utility Costs of Main Station AES Greenhouse - $400,000
2. Assessments for Road Improvement - TBD

SB 2020

17.0528.01000

Sixty-fifth
Legislative Assembly
of North Dakota

SENATE BILL NO. 2020

Introduced by

Appropriations Committee

A BILL for an Act to provide an appropriation for defraying the expenses of the North Dakota state university extension service, northern crops institute, upper great plains transportation institute, main research center, branch research centers, and agronomy seed farm.

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, 2017, and ending June 30, 2019, as follows:

Subdivision 1.

NORTH DAKOTA STATE UNIVERSITY EXTENSION SERVICE

	Base Level	Adjustments or Enhancements	Appropriation
Extension service	$52,517,908	$0	$52,517,908
Soil conservation committee	1,133,362	0	1,133,362
Total all funds	$53,651,270	$0	$53,651,270
Less estimated income	25,826,708	0	25,826,708
Total general fund	$27,824,562	$0	$27,824,562
Full-time equivalent positions	263.91	0.00	263.91

Subdivision 2.

NORTHERN CROPS INSTITUTE

	Base Level	Adjustments or Enhancements	Appropriation
Northern crops institute	$3,712,202	$0	$3,712,202
Total all funds	$3,712,202	$0	$3,712,202
Less estimated income	1,747,735	0	1,747,735
Total general fund	$1,964,467	$0	$1,964,467
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	$22,076,448	$0	$22,076,448
Total all funds	$22,076,448	$0	$22,076,448
Less estimated income	18,175,657	0	18,175,657
Total general fund	$3,900,791	$0	$3,900,791
Full-time equivalent positions	54.98	0.00	54.98

Subdivision 4.

MAIN RESEARCH CENTER

	Base Level	Adjustments or Enhancements	Appropriation
Main research center	$110,529,780	$0	$110,529,780
Total all funds	$110,529,780	$0	$110,529,780
Less estimated income	56,948,525	0	56,948,525
Total general fund	$53,581,255	$0	$53,581,255
Full-time equivalent positions	353.85	0.00	353.85

Subdivision 5.

BRANCH RESEARCH CENTERS

	Base Level	Adjustments or Enhancements	Appropriation
Dickinson research extension center	$6,996,678	$0	$6,996,678
Central grasslands research extension center	3,531,779	0	3,531,779
Hettinger research extension center	5,086,767	0	5,086,767
Langdon research extension center	3,045,836	0	3,045,836
North central research extension center	5,044,213	0	5,044,213
Williston research extension center	5,267,400	0	5,267,400
Carrington research extension center	9,328,093	0	9,328,093
Total all funds	$38,300,766	$0	$38,300,766
Less estimated income	19,817,130	0	19,817,130
Total general fund	$18,483,636	$0	$18,483,636
Full-time equivalent positions	113.94	0.00	113.94

Subdivision 6.

AGRONOMY SEED FARM

	Base Level	Adjustments or Enhancements	Appropriation
Agronomy seed farm	$1,521,007	$0	$1,521,007
Total special funds	$1,521,007	$0	$1,521,007
Full-time equivalent positions	3.00	0.00	3.00

Subdivision 7.

BILL TOTAL

	Base Level	Adjustments or Enhancements	Appropriation
Grand total general fund	$105,754,711	$0	$105,754,711
Grand total other funds	124,036,762	0	124,036,762
Grand total all funds	$229,791,473	$0	$229,791,473

SECTION 2. ONE-TIME FUNDING. The following amounts reflect the one-time funding items approved by the sixty-fourth legislative assembly as adjusted for the 2015-17 biennium:

One-Time Funding Description	2015-17	2017-19
Agronomy laboratories	$150,000	$0
Rural leadership project	141,252	0
Seed cleaning plants	4,408,224	0
Upper great plains transportation institute road study	628,823	0
Junior master gardener program	12,500	0
Veterinary diagnostic laboratory	18,000,000	0
Dust issues technical support	100,000	0
Land purchase - Langdon	350,000	0
Flooded lands study	67,952	0
Total all funds	$23,858,751	$0
Total other funds	21,325,000	0
Total general fund	$2,533,751	$0

SECTION 3. ADDITIONAL INCOME - APPROPRIATION. In addition to the amount included in the grand total other 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 the act, grant, gift, or donation, for the biennium beginning July 1, 2017, and ending June 30, 2019.

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 2017-19 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, 2017, and ending June 30, 2019.

SECTION 5. WILLISTON RESEARCH EXTENSION CENTER - MINERAL RIGHTS INCOME - REPORT. The Williston research extension center shall report to the sixty-sixth legislative assembly on amounts received and spent from mineral royalties, leases, or easements in the biennium beginning July 1, 2015, and ending June 30, 2017, and the biennium beginning July 1, 2017, and ending June 30, 2019.

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 state 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. All full-time or part-time positions must be separate from North Dakota state university. Annually, the board shall report to the office of management and budget and to the budget section any adjustments made pursuant to this section.

SECTION 8. UNEXPENDED GENERAL FUND - EXCESS INCOME. 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, 2019, and ending June 30, 2021.

SB 2080

17.8112.01000

Sixty-fifth
Legislative Assembly
of North Dakota

SENATE BILL NO. 2080

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 North Dakota state university extension service, northern crops institute, upper great plains transportation institute, main research center, branch research centers, and agronomy seed farm; and to provide an exemption.

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, 2017, and ending June 30, 2019, as follows:

Subdivision 1.

NORTH DAKOTA STATE UNIVERSITY EXTENSION SERVICE

	Base Level	Adjustments or Enhancements	Appropriation
Extension service	$52,517,908	$37,277	$52,555,185
Soil conservation committee	1,133,362	(41,842)	1,091,520
Total all funds	$53,651,270	($4,565)	$53,646,705
Less estimated income	25,826,708	941,881	26,768,589

Total general fund	$27,824,562	($946,446)	$26,878,116
Full-time equivalent positions	263.91	10.93	252.98

Subdivision 2.

NORTHERN CROPS INSTITUTE

	Base Level	Adjustments or Enhancements	Appropriation
Northern crops institute	$3,712,202	$1,243	$3,713,445
Total all funds	$3,712,202	$1,243	$3,713,445
Less estimated income	1,747,735	10,008	1,757,743
Total general fund	$1,964,467	($8,765)	$1,955,702
Full-time equivalent positions	12.00	(0.20)	11.80

Subdivision 3.

UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

	Base Level	Adjustments or Enhancements	Appropriation
Upper great plains transportation institute	$22,076,448	$145,575	$22,222,023
Total all funds	$22,076,448	$145,575	$22,222,023
Less estimated income	18,175,657	482,465	18,658,122
Total general fund	$3,900,791	($336,890)	$3,563,901
Full-time equivalent positions	54.98	(11.10)	43.88

Subdivision 4.

MAIN RESEARCH CENTER

	Base Level	Adjustments or Enhancements	Appropriation
Main research center	$110,529,780	$11,812	$110,541,592
Total all funds	$110,529,780	$11,812	$110,541,592
Less estimated income	56,948,525	2,263,756	59,212,281
Total general fund	$53,581,255	($2,251,944)	$51,329,311
Full-time equivalent positions	353.85	(17.73)	336.12

Subdivision 5.

RESEARCH CENTERS

	Base Level	Adjustments or Enhancements	Appropriation
Dickinson research center	$6,996,678	($48,789)	$6,947,889
Central grasslands research center	3,531,779	(40,136)	3,491,643
Hettinger research center	5,086,767	(29,081)	5,057,686
Langdon research center	3,045,836	(25,004)	3,020,832
North central research center	5,044,213	(18,626)	5,025,587
Williston research center	5,267,400	(45,697)	5,221,703
Carrington research center	9,328,093	(18,220)	9,309,873
Total all funds	$38,300,766	($225,553)	$38,075,213
Less estimated income	19,817,130	492,980	20,310,110
Total general fund	$18,483,636	($718,533)	$17,765,103
Full-time equivalent positions	113.94	(3.65)	110.29

Subdivision 6.

AGRONOMY SEED FARM

	Base Level	Adjustments or Enhancements	Appropriation
Agronomy seed farm	$1,521,007	$17,788	$1,538,795
Total special funds	$1,521,007	$17,788	$1,538,795
Full-time equivalent positions	3.00	0.00	3.00

Subdivision 7.

BILL TOTAL

	Base Level	Adjustments or Enhancements	Appropriation
Grand total general fund	$105,754,711	($4,262,578)	$101,492,133
Grand total other funds	124,036,762	4,208,878	128,245,640
Grand total all funds	$229,791,473	($53,700)	$229,737,773

SECTION 2. ONE-TIME FUNDING. The following amounts reflect the one-time funding items approved by the sixty-fourth legislative assembly for the 2015-17 biennium:

One-Time Funding Description	2015-17	2017-19
Agronomy laboratories	$150,000	$0
Rural leadership project	141,252	0
Seed cleaning plants	4,408,224	0
Upper great plains transportation institute road study	628,823	0
Junior master gardener program	12,500	0
Veterinary diagnostic laboratory	18,000,000	0
Dust issues technical support	100,000	0
Land purchase - Langdon	350,000	0
Flooded lands study	67,952	0
Total all funds	$23,858,751	$0
Total other funds	21,325,000	0
Total general fund	$2,533,751	$0

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 the act, grant, gift, or donation, for the biennium beginning July 1, 2017, and ending June 30, 2019.

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 2017-19 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, 2017, and ending June 30, 2019.

SECTION 5. WILLISTON RESEARCH EXTENSION CENTER - MINERAL RIGHTS INCOME. The Williston research extension center shall report to the sixty-sixth legislative assembly on amounts received and spent from mineral royalties, leases, or easements in the biennium beginning July 1, 2015, and ending June 30, 2017, and the biennium beginning July 1, 2017, and ending June 30, 2019.

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 prior to the submission of the 2019-21 budget request.

SECTION 8. UNEXPENDED GENERAL FUND - EXCESS INCOME. 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, 2019, and ending June 30, 2021.

SECTION 9. EXEMPTION. The amounts appropriated for the veterinary diagnostic laboratory and the seed cleaning plants contained in subdivision 4 of section 1 of chapter 20 of the 2015 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, 2017, and ending June 30, 2019.

Financial Schedules

Extension Service, Main, and Branch Research Centers
Reconciliation of 2015-17 Original General Fund Appropriation to 2017-19 Executive Recommendation (SB 2020 /2080)

	Extension Service	Main Research Center	Branch Research Centers
2015-17 Original General Fund Appropriation	**$ 29,788,188**	**$ 59,067,612**	**$ 20,073,447**
Reduction of 6.55% for Allotment	**$ (1,951,126)**	**$ (3,868,929)**	**$ (1,314,811)**
	27,837,062	**55,198,683**	**18,758,636**
Less: Capital and One-time	(12,500)	(1,617,428)	(275,000)
2015-17 Adjusted Appropriation / SB 2020 Appropriation	**27,824,562**	**53,581,255**	**18,483,636**
2017-19 Changes in Executive Recommendation (SB 2080)			
Adjustment between Allotment and Gov. Guidelines (10% Gov vs. 6.55% Allotment)	(1,026,443)	(1,970,656)	(665,035)
Base payroll adjustment	302,125	596,490	181,396
Compensation Package (1% in FY 19)	495,078	851,324	303,670
Change in Bond payments	-	42,448	15,056
Funding change GF to Special	(200,000)	(1,600,000)	(350,000)
Equipment Reduction	-	(100,000)	(175,000)
Reduction in Health Insurance for decreased FTE	(37,206)	(71,550)	(28,620)
Further Reduction	(480,000)	-	-
Total Changes	(946,446)	(2,251,944)	(718,533)
SB 2080 Appropriation	**$ 26,878,116**	**$ 51,329,311**	**$ 17,765,103**

No optional items submitted were funded in the Executive Recommendation

Reconciliation of 2015-17 Original Other Fund Budget Appropriation to 2017-19 Executive Recommendation (SB 2020 / 2080)

2015-17 Original Other Fund Appropriation	**$ 25,826,708**	**$ 78,098,525**	**$ 19,992,130**
Remove Capital Project	-	(21,150,000)	(175,000)
2015-17 Adjusted Other Fund Appropriation / SB 2020 Appropriation	**$ 25,826,708**	**$ 56,948,525**	**$ 19,817,130**
2017-19 Changes in Executive Recommendation (SB 2080)			
Base Payroll adjustments	265,427	196,105	30,744
1% salary/benefit increase FY19 and 2018-19 health insurance increases	476,454	467,651	112,236
Other changes in estimated income	200,000	1,600,000	350,000
SB 2080 Other Fund changes	**941,881**	**2,263,756**	**492,980**
SB 2080 Other Fund Appropriation	**$ 26,768,589**	**$ 59,212,281**	**$ 20,310,110**

Branch Research Centers Detail
Reconciliation of 2015-17 Original General Fund Appropriation to 2017-19 Executive Recommendation (SB 2020 / 2080)

	Dickinson REC	Central Grasslands REC	Hettinger REC	Langdon REC	North Central REC	Williston REC	Carrington REC	Total
2015-17 Original General Fund Appropriation	**$ 3,992,095**	**$ 2,302,107**	**$ 2,510,254**	**$ 2,004,271**	**$ 2,179,057**	**$ 3,155,573**	**$ 3,930,090**	**$ 20,073,447**
Reduction of 6.55% for Allotment	**$ (261,483)**	**$ (150,788)**	**$ (164,421)**	**$ (131,280)**	**$ (142,728)**	**$ (206,690)**	**$ (257,421)**	**$ (1,314,811)**
	3,730,612	**2,151,319**	**2,345,833**	**1,872,991**	**2,036,329**	**2,948,883**	**3,672,669**	**18,758,636**
Less: Capital and One-time	(100,000)			(175,000)				(275,000)
2015-17 Adjusted Appropriation / SB 2020 Appropriation	**3,630,612**	**2,151,319**	**2,345,833**	**1,697,991**	**2,036,329**	**2,948,883**	**3,672,669**	**18,483,636**
2017-19 Changes in Executive Recommendation (SB 2080)								
Adjustment between Allotment and Gov. Guidelines (10% Gov vs. 6.55% Allotment)	(127,727)	(79,423)	(86,604)	(51,647)	(75,178)	(108,867)	(135,588)	(665,034) -
Base payroll adjustment	34,610	27,255	22,330	16,560	29,819	24,560	41,212	196,346
Compensation Package (1% in FY 19)	48,089	39,584	43,101	29,528	31,079	48,007	64,283	303,671
Change in Bond payments	-	40	-	-	64	-	-	104
Funding change GF to Special	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)	(350,000)
Equipment Reduction	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)	(175,000)
Reduction in Health Insurance for decreased FTE	(5,724)	(4,293)	(2,862)	(2,862)	(4,293)	(2,862)	(5,724)	(28,620)
Total Changes	(125,752)	(91,837)	(99,035)	(83,421)	(93,509)	(114,162)	(110,817)	(718,533)
SB 2080 Appropriation	**3,504,860**	**2,059,482**	**2,246,798**	**1,614,570**	**1,942,820**	**2,834,721**	**3,561,852**	**17,765,103**

No optional items submitted were funded in the Executive Recommendation

Reconciliation of 2015-17 Original Other Fund Appropriation to 2017-19 Executive Recommendation (SB 2020 / 2080)

2015-17 Original Other Fund Appropriation	**$ 3,366,067**	**$ 1,380,460**	**$ 2,740,933**	**$ 1,522,845**	**$ 3,007,884**	**$ 2,318,517**	**$ 5,655,424**	**$ 19,992,130**
Adjustments				(175,000)				**(175,000)**
2015-17 Adjusted Other Fund / SB 2020 Appropriation	**$ 3,366,067**	**$ 1,380,460**	**$ 2,740,933**	**$ 1,347,845**	**$ 3,007,884**	**$ 2,318,517**	**$ 5,655,424**	**$ 19,817,130**
Executive Recommendation Increases (Decreases):								
Base Payroll adjustments	11,767	(4,258)	7,106	2,930	(1,461)	1,604	13,056	30,744
Compensation package (1% year two) and health insurance & retirement increases	9,471	1,666	9,987	2,625	22,051	13,999	52,437	112,236
Estimated income increase	50,000	50,000	50,000	50,000	50,000	50,000	50,000	350,000
SB 2080 Other Fund changes	**71,238**	**47,408**	**67,093**	**55,555**	**70,590**	**65,603**	**115,493**	**492,980**
SB 2080 Other Fund Appropriation	**$ 3,437,305**	**$ 1,427,868**	**$ 2,808,026**	**$ 1,403,400**	**$ 3,078,474**	**$ 2,384,120**	**$ 5,770,917**	**$ 20,310,110**

NDSU Extension Service - 630

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$27,837,061**	**$18,314,819**	**$9,522,242**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Main Research Station - 640

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	*** $55,698,821**	**$34,402,705**	**$21,296,116**	**--Balance will be drawn down for expenditures by end of biennium.**
				*** Includes carryover of $500,137**

Source: November 2016 Appropriation Status Report

Note: uncertain changes expected to Federal funding levels.

NDSU Dickinson Research Center- 641

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 3,730,612**	**$ 2,355,693**	**$ 1,374,919**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Central Grasslands Research Center- 642

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 2,151,319**	**$ 1,455,353**	**$ 695,966**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Hettinger Research Center- 643

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 2,345,833**	**$ 1,754,743**	**$ 591,090**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Langdon Research Center- 644

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 1,872,991**	**$ 1,311,844**	**$ 561,147**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU North Central Research Center- 645

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 2,036,329**	**$ 1,266,635**	**$ 769,694**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Williston Research Center- 646

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 2,948,883**	**$ 1,985,105**	**$ 963,778**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Carrington Research Center- 647

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total General Fund Appropriation	**$ 3,672,669**	**$ 2,345,444**	**$ 1,327,225**	**--Balance will be drawn down for expenditures by end of biennium.**

Source: November 2016 Appropriation Status Report

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

NDSU Agronomy Seed Farm- 649

Comparison of 2015-17 Appropriation and Estimated Spending

	2015-17 Appropriation	Actual Expenditures Through 11/30/16	Remaining Balance	Comments
Total Appropriation	**$ 1,521,007**	**$ 945,419**	**$ 575,588**	

Source: November 2016 Appropriation Status Report

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

640 - Main Research Center

"Original 2015-17 budget and the effects of the budget reductions approved August 2016"

Total Budget

	Original Appropriations	Reductions	Adjusted Appropriations
Total all funds	$137,166,137	($3,868,929)	$133,297,208
Less estimated income	78,098,525	0	78,098,525
Total general fund	$59,067,612	($3,868,929)	$55,198,683

One-Time, General Fund

Original One-time items	Original Appropriations	Reductions	Adjusted Appropriations
Rural leadership project	$150,000	($8,748)	$141,252
Flooded lands study	72,500	($4,548)	67,952
Seed cleaning plants	1,500,000	($91,776)	1,408,224
Total	$1,722,500	($105,072)	$1,617,428

Ongoing, General Fund

Programs	Original Ongoing Appropriations	Ongoing Appropriation Reductions	Adjusted Ongoing Appropriations
Main Research Center	$57,345,112	($3,763,857)	$53,581,255

Effects of the allotment:

The Main Station addressed the allotment with a combination of operating and position cuts. Positions are frozen as they become vacant. If a position is deemed critical, a recruitment may take place. A Voluntary Separation Incentive Program was initiated and resulted in a reduction of 7.53 FTE with annual Main Station salaries totaling $605,671. Operating allocations were reduced by 10% in FY 2017. Equipment funds were reduced.

630 - NDSU Extension Service

"Original 2015-17 budget and the effects of the budget reductions approved August 2016"

Total Budget

	Original Appropriations	Reductions	Adjusted Appropriations
Extension service	$54,402,096	($1,871,688)	$52,530,408
Soil conservation committee	1,212,800	(79,438)	1,133,362
Total all funds	$55,614,896	($1,951,126)	$53,663,770
Less estimated income	25,826,708	0	25,826,708
Total general fund	$29,788,188	($1,951,126)	$27,837,062

One-Time, General Fund

One-time items	Original Appropriations	Reductions	Adjusted Appropriations
Burleigh Co Junior Master Gardener Program	$12,500		$12,500
Total	$12,500	$0	$12,500

Ongoing, General Fund

Programs	Original Ongoing Appropriations	Ongoing Appropriation Reductions	Adjusted Ongoing Appropriations
Extension service	$28,562,888	($1,871,688)	$26,691,200
Soil conservation committee	$1,212,800	($79,438)	$1,133,362

Effects of the allotment:

The NDSU Extension Service addressed the allotment with a combination of operating and position cuts. Positions are frozen as they become vacant. If a position is deemed critical, a recruitment may take place. A Voluntary Separation Incentive Program was initiated and resulted in a reduction of 5.27 FTE with annual NDSU Extension Service salaries totaling $385,462. Operating allocations were reduced by 10% in FY 2017.

628 - Branch Research Centers

"Original 2015-17 budget and the effects of the budget reductions approved August 2016"

Total Budget

Line item	Original Appropriations	Reductions	Adjusted Appropriations
Dickinson REC	$7,358,161	($261,483)	$7,096,678
Central Grasslands REC	3,682,567	(150,788)	3,531,779
Hettinger REC	5,251,188	(164,421)	5,086,767
Langdon REC	3,527,116	(131,280)	3,395,836
North Central REC	5,186,941	(142,728)	5,044,213
Williston REC	5,474,090	(206,690)	5,267,400
Carrington REC	9,585,514	(257,421)	9,328,093
Total all funds	$40,065,577	($1,314,811)	$38,750,766
Less estimated income	19,992,130	0	19,992,130
Total general fund	$20,073,447	($1,314,811)	$18,758,636

One-Time, General Fund

One-time items	Original Appropriations	Reductions	Adjusted Appropriations
Dust issues tech support - DREC	$100,000		$100,000
Cavalier County property purchase	175,000		175,000
Total	$275,000	$0	$275,000

Ongoing, General Fund

Programs	Original Ongoing Appropriations	Ongoing Appropriation Reductions	Adjusted Ongoing Appropriations
Dickinson research center	$3,892,095	($261,483)	$3,630,612
Central grasslands research center	$2,302,107	($150,788)	$2,151,319
Hettinger research center	$2,510,254	($164,421)	$2,345,833
Langdon research center	$1,829,271	($131,280)	$1,697,991
North central research center	$2,179,057	($142,728)	$2,036,329
Williston research center	$3,155,573	($206,690)	$2,948,883
Carrington research center	$3,930,090	($257,421)	$3,672,669
	$19,798,447	($1,314,811)	$18,483,636

Effects of the allotment:

The Branch Stations addressed the allotment with a combination of operating and position cuts. Positions are frozen as they become vacant. If a position is deemed critical, a recruitment may take place. A Voluntary Separation Incentive Program was initiated and resulted in a reduction of 3.0 FTE with annual Branch Station salaries totaling $151,021. Operating allocations were reduced by 10% in FY 2017. Equipment funds were reduced.

The 10% adjustmenst necessary to meet the Governor's Budget request guideline was entered into IBARS via Change Package AA1 and described as follows:

NDSU Extension Service

The Governor's budget guidelines called for all state agencies to submit a 90 percent budget request. The 10 percent reduction equals $2,977,569 for Extension. To meet this amount, Extension would eliminate 10 positions ($1.6M) in administration, state specialist, area specialist, county, technician, and support staff positions. The budget for new equipment purchases would be reduced by $300,000 and operating budgets would be reduced by $956,289. Extension program areas in agriculture, 4-H, family and consumer sciences, and agricultural communications would be affected.

Funding for Soil Conservation Committee assistance would be reduced by 10% ($121,280).

Branch RECs

The Governor's budget guidelines called for all state agencies to submit a 90 percent budget request. The Directors of the REC collectively proposed a reduction strategy that was approved by SBARE on August 2, 2016. The plan calls for a reduction of General Funded posiitons, reduced State Fleet vehicles, reduced travel, and a shifting of expenses from General Fund to Other Funds.

Between elimination and shifting to Other Fund sources (if available), General Fund FTE are estimated to be reduced as follows:
DREC 2.0 FTE up to $330,000 biennial impact
CGREC 1.0 FTE up to $120,000 biennial impact
HREC 1.5 FTE up to $200,000 biennial impact
LREC 1.0 FTE up to $80,000 biennial impact
NCREC 1.5 FTE up to $180,000 biennial impact
WREC 1.0 FTE up to $165,000 biennial impact
CREC 2.0 FTE up to $250,000 biennial impact
Total 10.0 FTE up to $1,325,000 biennial impact
The remaining $654,845 reduction is from operating expenses.

Main Station

The Governor's budget guidelines called for all state agencies to submit a 90 percent budget request. The 10 percent reduction equals $5,734,511 for the Main Station. To meet this amount, the Main Station would eliminate 25 FTE ($4.25 M) in administrative, faculty, technical, and support staff positions. Operating budgets would be reduced by $1,484,511 through strategic program cuts and/or closures, as approved by the State Board of Agricultural Research and Education.

North Dakota Agricultural Experiment Station

NDSU Extension Service

2017-2019
Biennial Budget Request

Senate Bill 2020 / 2080
Senate Appropriations Committee
Senator Ray Holmberg, chair
Jan. 18, 2017

NDSU NORTH DAKOTA STATE UNIVERSITY