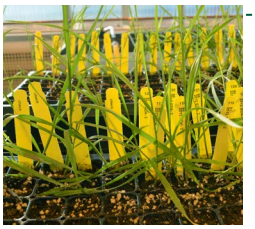
NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2015-17 Program Initiatives as Ranked by SBARE



1 Bioinformatics

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

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

2 Precision Ag

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

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

3 Enhancing Research Infrastructure for Greater Research Efficiencies and Effectiveness

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

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

4 Risk and Trade

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

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

5 Enhancing Research Capacity at the RECs

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

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

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

6 Genetics and Genomics Initiative

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

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

7 Livestock Research to Enhance Productivity and Profitability

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

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

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

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

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

9 Soil Health Research Support

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

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