

## FY 2020 Annual Report of Accomplishments and Results

North Dakota

North Dakota State University

### I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your FY 2020 Plan of Work located in the Institutional Profile. Use this space to provide updates if needed.

#### 1. Executive Summary (Optional)

##### **NDAWN Provides Valuable Information for Ag Producers**

Current and historical weather information, soil temperature data, growing degree day models, disease and insect forecasting models, soil moisture data and a whole host of other agricultural applications are just a small part of what is known as the North Dakota Agricultural Weather Network, or NDAWN. This network of 159 stations distributed across North Dakota and border regions of surrounding states is part of NDSU's North Dakota Agricultural Experiment Station. The stations monitor and record local weather conditions throughout the state and the Red River Valley, and disseminate timely, detailed, accurate information through an array of summaries and innovative displays on the NDAWN website. NDAWN was designed to provide weather data for the development of agricultural models. Producers can make management decisions using models that predict future crop and pest development based on recent weather conditions. The models can warn of impending disease or insect infestations so producers can apply pesticides at the optimum time for maximum efficacy to improve crop yields and profits. "We use the NDAWN stations almost every day throughout the growing season for many reasons," says an agricultural producer from Hope, N.D. "During planting season, we use the soil temperature data to help decide if we should be planting yet or not. During spraying, we are using it for wind direction, wind speed and also air temperature inversion warnings. Then in the fall, we watch the soil temperatures again to see when we can start applying ammonia. We also use them to monitor the rainfall amounts." In the fall of 2020, the U.S. Army Corps of Engineers awarded NDAWN a \$6.4 million five-year grant to upgrade and build new stations across North Dakota. A large portion of the grant will be dedicated to measuring moisture content in areas where such data was unavailable. The one climate element that we have the least amount of data on is the moisture content in snow. It's not the depth of snow that matters, it's the moisture content in the snow. Measuring moisture content is a critical predictor of spring flooding and drought conditions.

### **Crop Protection Product Development**

Research at NDSU's North Central Research Extension Center (NCREC) near Minot is leading to the development of crop protection products for minor crops. Crop protection manufacturers typically focus their resources on developing products for the major crops such as corn, soybeans and wheat. Far fewer resources are devoted to small-acreage crops. To fill this void and expand the registration of crop protection products for minor crops, the NCREC became involved in IR-4, a federal program with the goal of registering new products for farmers and ensuring that chemical residues are below established safety standards. Since 1998, center scientists have conducted 78 trials that included 32 active ingredients and 14 commodities: lentils, confection and oil sunflowers, millet, wheat, barley, canola, dry peas, sugar beets, dry beans, sorghum, oats, safflowers and flax. These trials have led to the registration of 20 active ingredients for 10 commodities, and more are being prepared for submission. The NCREC conducts an average of three to four of these studies each year. Each study requires scientists to complete a field data book. The book must contain information such as the study protocol, personnel training records, site maps and field history, chemical storage dates and temperatures, equipment maintenance and calibration records, application records, weather data and sampling data. By the time the books are completed, they contain more than 100 pages of study data. The study director uses the books to write a final report, which is submitted to the Environmental Protection Agency (EPA). The process takes approximately three to four years to go from study initiation to the IR-4 report submitted to EPA to the registration of a product that farmers can use in their fields. This benefits farmers by giving them more crop protection products to control pests such as weeds, diseases and insects.

### **Extension Provides Gardening Expertise**

Like many gardeners, a Grand Forks County North Dakota resident is anxious to get back in the garden. NDSU Extension provides people like her with expertise on a variety of gardening topics through annual events such as Gardening Saturday, which includes educational programs, opportunities to talk with gardening vendors and lots of gardening camaraderie. "Gardening Saturday has always been a great inspiration and a fun way to get ready for the gardening season," the resident says. "It's packed with great speakers and topics to keep you up to date on the latest gardening practices and also the tried and true ones. This Grand Forks County resident is among hundreds of gardening enthusiasts who have attended Gardening Saturdays and other Extension programs such as Spring Fever Garden Forums. More than 850 gardeners attended the forums in 2020. The Master Gardener (MG) program is another way NDSU Extension helps North Dakotans hone their gardening skills. To become Master Gardeners, participants take 40 hours of training, then volunteer 48 hours on horticultural projects. Master Gardeners help

beautify communities, educate the public about gardening and encourage conservation of natural resources. “The program was all that I expected it to be and so very much more,” says a resident for Wilkin County, Minnesota. This is just one example of the multistate programing that goes on between North Dakota and Minnesota.

The Junior Master Gardener program provides funds for gardening projects, such as establishing school gardens, beautifying parks, growing food for the needy and constructing raised beds for senior citizens. More than 3,300 youth participated in projects in 2020.

Gardeners also help evaluate promising vegetable, herb and flower varieties through NDSU Extension’s home gardening variety trials program. Their research leads to the development of a list of recommended varieties for the state. NDSU Extension also offers many gardening resources, including a website, two newsletters, numerous publications and an ask-an-expert option. Extension provides the reliable, research-based information you need to identify and solve problems with your lawns, gardens and trees.

### **Patch Burn Grazing Shows Benefits**

Research at NDSU’s Central Grasslands Research Extension Center (CGREC) shows Patch burning has positive impacts on plant communities and soil properties, enhanced the flowering plants that increase pollinator and bird habitat, and increased livestock performance. Fire was, and still is, a natural disturbance to our rangelands, and depending on the timing of the burn, can create both long- and short-term benefits. Scientists from the CGREC and range science faculty at the NDSU main station scientists work collaboratively. Among their findings: Cows average daily gain was highest on two patch-burn grazing treatments, compared with modified twice-over rest-rotation grazing. For this study, patch burning is burning one of four approximately 40 acre patches each year with-in a quarter section (160 acres) of grass land. Cattle naturally select the burned patches for grazing because they like to eat the most nutritious and palatable forage found in the most recently burned patch. In the modified twice-over rest-rotation grazing treatment, the grazing area is divided into four relatively equal patches and fenced. Cattle are rotated through the patches twice and allowed to graze for a certain number of days. “Fires have been beneficial,” confirms a local producer in Sheridan and McLean counties. “We’ve seen forbes express themselves after a fire. We’ve set back some Kentucky bluegrass and brome grass. We’ve also seen some native greases appear in places we haven’t seen for a while.” The scientists also found that flowering plant abundance and diversity were higher in patch-burn grazing treatments, compared with season-long grazing. In light of these conclusions, patch-burn grazing appears to be an effective conservation tool for those seeking to increase resource availability for native rangeland pollinators.

#### **4-H'ers Honored for Learning, Practicing Healthful Habits**

Every year, 4-H clubs across North Dakota are recognized for demonstrating their commitment to learning about and practicing healthful habits by being designated as a Healthy North Dakota 4-H Club. To earn that honor, they incorporate nutrition, fitness and health activities into their club meetings during the year. For instance, the Missouri Valley Bunch 4-H Club in Morton County plants flowers around the county courthouse and takes care of them all summer. The 4-H'ers also have worked with residents of Edgewood in Mandan to create raised gardens. In addition, the club holds an annual family picnic with an outdoor activity such as archery, hiking, outdoor cooking, Dutch oven cooking or volleyball. At club meetings, the 4-H'ers have learned to cook and bake, and members have taught the club how to swing dance. They've also gone bowling, kayaking, ice skating and swimming. This program has been very beneficial, according to a club leader. "It keeps us thinking of new ways to stay active and make healthy choices," they said. The Clover Friends 4-H Club in Cass County has healthful snacks and answers health-related roll call questions at meetings. The youth also have had water fights; gone swimming and camping; and played lawn games, miniature golf, baseball and kickball. "We think it is very important to encourage youth and families to adapt healthy habits to incorporate as part of their daily routine," a club co-leader says. Clubs can earn extra recognition for completing the Family Mealtime Challenge, which encourages families to set a goal for weekly family meals. The fourth 'H' in 4-H stands for 'health,' and these recognized clubs are making healthful habits part of the culture of their clubs.

#### **NDSU Breeding Barley Varieties for Craft Brewing Industry**

The craft brewing industry is growing, and NDSU scientists are playing a role. Approximately 12 years ago, craft brewers approached NDSU scientists specializing in malting barley quality, to see if NDSU had any barley varieties that would work for them. The scientists offered the craft brewers the same high-quality varieties they bred for large commercial brewers. However, the craft brewers tried those varieties but found the varieties were too high in protein and enzymes. The desired malting barley specifications expressed by the craft brewers sounded just like the varieties NDSU routinely discarded because these varieties did not fit the profile the large brewers wanted. According to the NDSU scientists, the barley varieties were here all along, NDSU just needed someone to tell us what they wanted. NDSU's barley breeding efforts also will benefit North Dakota producers. "It's become a lot of fun to work with these craft brewers and the craft maltsters because it really gives us an opportunity to develop some materials that wouldn't have been available to the farmers otherwise if it wasn't for the craft sector," the scientists say. The scientists haven't developed varieties for the craft brewers yet, but they are making progress. Currently varieties are in the testing stages and craft brewers are evaluating NDSU's advanced lines. North Dakota ranks third in the nation for barley production.

### **NDSU Extension Develops Resources for Parenting in a Pandemic**

Parents are juggling a lot now as they navigate the competing demands of work, parenting and schooling during COVID-19. While each family faces a unique set of challenges, all parents need additional support as they work to stay connected to their kids and navigate the unique stressors of this moment. That context led North Dakota State University Extension to develop multiple resources to help families cope with the stress of these unprecedented times. The resources are designed to help strengthen family connections and explore practical stress recovery and resilience strategies for kids and adults alike. When parents and other adults don't have ready and satisfying answers for children and youth, the lack of information can create uncertainty, fear and insecurity in children. Pandemics can be similar to other disasters or traumatic events in their effects on children. Such disasters tend to be events that are quite sudden, very disruptive, lasting in their effects and public in their impact. Children look to parents or other adults for insight into how to respond to difficult circumstances or events. Staying calm and setting a supportive example for children is important. The resources we developed offer practical things for adults to both say and do with children of all ages to help them feel less stressed. Extension resources with tips for recognizing and dealing with stress include multiple publications and local Extension workshops. A 2021 statewide webinar series, Parenting in a Pandemic, will offer four separate sessions on how parents and children can stay productive despite changing routines, how to navigate screen time with children, how to negotiate conflict and boundaries, and how to support and connect with teens.

## II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Process	Updates ONLY
1. The <u>Merit Review Process</u>	No updates to the 2020 Plan of Work.
2. The <u>Scientific Peer Review Process</u>	No updates to the 2020 Plan of Work.

### III. Stakeholder Input

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates ONLY
1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation	No updates to the 2020 Plan of Work.
2. Methods to identify individuals and groups and brief explanation.	No updates to the 2020 Plan of Work.
3. Methods for collecting stakeholder input and brief explanation.	No updates to the 2020 Plan of Work.
4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.	No updates to the 2020 Plan of Work.

#### IV. Critical Issues Table of Contents

No.	Critical Issues in order of appearance in Table V. Activities and Accomplishments
1.	Cropping Systems
2.	Natural Resources
3.	Livestock Systems
4.	Economic and Community Vitality
5.	4-H, Youth Development
6.	Human Development and Education
7.	

#### V. Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). In your outcome or impact statement, please include the following elements (in any order): 1) the issue and its significance (e.g. who cares and why); 2) a brief description of key activities undertaken to achieve the goals and objectives; 3) changes in knowledge, behavior, or condition resulting from the project or program’s activities; 4) who benefited and how. Please weave supporting data into the narrative.

No.	Project or Program Title	Outcome/Impact Statement	Critical Issue Name or No.
1.	<b>Tackling Wheat Disease Issues in 2020</b>	<p><b>Issue</b> - Bacterial leaf streak, ergot and Fusarium head blight were the top three diseases for wheat producers in 2020. Bacterial leaf streak can result in 20-40% yield loss on susceptible varieties. Ergot levels in harvested grain have led to severe discounts and rejections for some growers. Fusarium head blight can result in yield loss and reduction of grain quality.</p> <p><b>Response</b> - State specialists, off-campus specialists, and county agents hosted (in-person or virtually) Extension events across the state in 2020. Information pertaining to bacterial leaf streak, ergot and Fusarium head blight was delivered 16 times at a variety of venues including Best of the</p>	Cropping Systems



		<p>Best meetings, County Ag Improvement meetings, virtual field days, virtual commodity updates, and a training event for NDSU Extension Agents. Extension also provided timely updates during the growing season by writing nine Crop and Pest Reports and conducting seven radio interviews directly pertaining to these three diseases.</p> <p><b>Impact</b> - To help document the impact of information received on these three diseases, survey results from two heavily attended Best of the Best East meetings will be used. Combining (averaging) results from both meetings 49% of the audience learned something new and useful, and 37% of the audience indicated they gained important insight and information that they will apply to their operation and job.</p> <p><b>Public Value</b> - Diseases continue to be one of the greatest limiting factors for wheat production resulting in direct losses (ie: growers earnings) and indirect losses (ie: less money spent to support local businesses) for North Dakota.</p>	
2.	<p><b>Variety development</b></p>	<p><b>Issue</b> – North Dakota agriculture needs varieties that thrive in its challenging environment. Spring wheat is a major economic contributor to the cropping systems of ND.</p> <p><b>Response</b> – In 2020, 15% of North Dakota’s spring wheat acreage was sown to varieties developed at NDSU. According to NASS estimates, the cash value of the 2019 spring wheat crop was about \$1.3 billion. Remaining popular because of superior baking quality, ‘Glenn’ (2005) was the leading NDSU developed variety sown in 2020, with 3.6% of ND acreage. ‘ND Frohberg’ (2020) was released in to replace ‘Glenn’ and can yield 5-10% more, with similar quality.</p> <p><b>Impact</b> - Replacing even 50% of ‘Glenn’ acreage would return an average of \$22 million annually in cash grain value to producers, assuming average state yield and grain price.</p>	<p>Cropping Systems</p>

		<p><b>Public Value</b> - According to an NDSU University Distinguished Professor, an NDSU spring wheat variety has an estimated direct economic impact to the state ranging from \$69 to \$284M beyond other competitive varieties, over the period it remains in the marketplace. The NDSU spring wheat breeder also coordinates the statewide variety trial testing, an unbiased source of data which is invaluable to farmers as they make variety planting decisions.</p>	
<p>3.</p>	<p><b>Networks for Soil Health: Sharing information through connections</b></p>	<p><b>Issue</b> - Soil health is more than just getting information in the hands of those who attend meetings, it’s about how information is shared amongst individuals in general.</p> <p><b>Response</b> - A network analysis was conducted using farmers attending the Soil Health Café Talk program between 2014 and 2019. Farmers were asked to list up to four other farmers that they talk with about soil health and the frequency in which they talk about soil health. We also asked them to list up to four other non-farmers they talk with about soil health and again the frequency of those discussions. They could list anyone, those listed didn’t have to attend a program to be part of the network. Data were then graphically presented in several formats – farmers listing farmers, farmers listing NDSU, farmers listing consultants and all individual farmers listed.</p> <p><b>Impact</b> - In the farmers only network, 51 respondents listed 134 individuals. Of these 134 listed, 111 of them were connected with the largest connected group of 20 individuals. In the famers, plus non-farmers network (complete network), 240 individuals were listed, 232 of them were connected and the largest connected group was 116 individuals. The size of the connected group, sharing information about soil health was over five-times larger when consultants, financial institutions, government, industry and NDSU people were identified. With only NDSU employees</p>	<p>Natural Resources</p>

		<p>and farmers listed in the network, the largest connected group is 71 (it is over three times larger than when only farmers are listed). The bottom line is that soil health information is shared and individuals are more connected in that sharing of information when NDSU and other non-farmer groups are identified and included</p> <p><b>Public Value</b> - Understanding knowledge gain and practice adoption rates of meeting attendees is useful to guide program content and assess value; however, seeing how information is shared throughout a community using network analyses helps us visualize relevance and importance of soil health to the public.</p>	
<p>4.</p>	<p><b>Land stewardship and energy development</b></p>	<p><b>Issue</b> – Energy develop in western ND has impacted the value of prime farmland with issues such as fluid spills and pipeline installations.</p> <p><b>Response</b> – ND AES scientist have engaged in work to reclaim brine spills resulting from the development of fracking wells. Additionally, they have worked on restoring agricultural and natural lands crisscrossed by pipeline.</p> <p><b>Impact</b> - Our research aims to restore soil productivity and reduce the cost of reclamation by identifying ways in which land can be reclaimed using crop rotations, tillage, and other methods. Our research aims to identify methods to restore pipeline impacted areas to productivity sooner and at lower cost.</p> <p>Public Value</p>	<p>Natural Resources</p>
<p>5.</p>	<p><b>Intersection of the Cattle and Beef Industries</b></p>	<p><b>Issue</b> - The beef industry was shaken to its core as COVID-19 disrupted the marketing, harvest, processing and distribution of livestock and poultry and their products. This series of programs was designed to give perspective to the situation created by the closing of harvest facilities as well as look at how COVID had disrupted the normal production cycle of beef. Due to the confusion and chaos surrounding this disruption, our objective with this webinar series to provide an accurate,</p>	<p>Livestock Systems</p>

		<p>science- and evidence-based overview of the U.S. beef industry from conception to consumption for cattle producers, consumers and decision makers.</p> <p><b>Response</b> - Collaborators from North Dakota State University Extension, Texas A&amp;M Agrilife Extension, and West Virginia University Davis College of Agriculture assembled experts from all facets of the beef industry continuum to present scientific and evidence-based information in a 15-session webinar format. Beginning on May 7, 2020, twice weekly webinars covered the following topics: Overview of the current situation; Imports, exports and MCOOL; Packer profits; The pork and poultry industries, how the beef industry is similar and different; Local meats: challenges and opportunities; The Beef Checkoff; In-depth perspective of how cattle are priced: a discussion about price and value discovery, and the futures market; Virtual packing plant tour; Ground beef, heavy carcasses and imports; Domestic and international supply and demand; Historical overview of the beef industry; Changes in how beef is supplied to consumers in grocery stores and restaurants; In depth perspective of drop credit, hide and offal; An In depth look at Market Cows: Trading in cows, upgrading cows and improving your cowherd; The Intersection of the Cattle and Beef Industries: Change is Inevitable. Progress is Optional. Has improvement in carcass merit and growth equaled to progress in the cowherd?</p> <p><b>Impact</b> - The webinar series garnered over 3000 in person participants from 8 countries. The webinar recordings have received over 400 views. Participant survey data demonstrated that 90 percent of attendees agreed or strongly agreed they learned what they expected. Surveys also indicated that producer knowledge significantly increased from prior to attending webinars to after receiving education. Before programming, 17</p>	
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		<p>percent of attendees rated their topic knowledge as “a lot” or a “great deal”, and after the webinar sessions, 81 percent of attendees rated their knowledge as “a lot” or a “great deal”.</p> <p>Attendees reported using the information taught on the webinars to make more educated business and policy decisions and several who were members of state legislatures stated they used the information to be more informed when developing or deciding on legislation impacting the beef industry</p> <p><b>Public Value</b> - The COVID-19 pandemic was disastrous to the United States beef industry. Marketing, processing, and distribution channels were interrupted in a manner never seen. This series of webinar provided accurate science and evidence-based information that allowed producers, consumers, and decision makers to make more informed decisions in the face of chaos. Only by understanding the entire breadth of the cattle and beef industries can we comprehend the impacts of major industry disruptions like the COVID19 pandemic or packing plant fires.</p>	
<p>6.</p>	<p><b>Malnutrition associated with Obesity in people</b></p>	<p><b>Issue</b> – Most often we associate malnutrition with undernutrition. The World Health Organization describes undernutrition as wasting (low body weight relative to height), stunting (low height relative to age), and underweight (low body weight for a given age). However, the WHO also classifies malnutrition as inadequate or excess vitamins and (or) minerals, overweight, and obesity. Anemia and indispensable amino acid malnutrition are physically manifested as wasting, stunting, and underweight as well as overweight and obesity. In other words, the food consumed may be adequate for the human body’s energy needs, yet be deficient in certain nutrients and nutrient combinations. That is how underweight and overweight/obesity co-exist in impoverished communities.</p>	<p>Livestock Systems</p>

		<p><b>Response</b> – An NDSU Animal Scientist used swine as a surrogate for humans to study the impact of a Western diet on physiological changes associated with development of pre-diabetes, obesity, and sarcopenia. A control diet was developed from the National Health and Nutrition Examination Survey: What We Eat in America, based on the median consumption patterns of Americans aged two years and older. Half the pigs on test consumed the control diet and half consumed the same diet, but all refined sugar (approximately 23% of total calories) was replaced calorie for calorie with cooked ground beef. The pigs consumed these diets for 93 days, beginning (on average) at 32 days of age at a daily ration of 3.4% of body weight. Compared to the control diet, pigs that consumed diets where beef replaced sugar gained 340 more grams of body weight per day, had 35% less subcutaneous fat, 48% less peri-renal fat, 60% less infiltration of intramuscular triglyceride, and 17.6% more lean body mass at the end of the test. Pigs eating the ground beef diet had greater serum concentrations of sodium, hemoglobin, and higher hematocrit over time on test as well as less serum ionic calcium, LDL, HDL and total cholesterol. No differences were seen for serum glucose, triglycerides, or insulin concentrations over time.</p> <p><b>Public Value</b> –Poor nutritional education can perpetuate food choices that over-emphasize starches (carbohydrates) at the expense of high-quality proteins, B-vitamins, and iron commonly found in readily digestible muscle foods. These poor diet choices can lead to a progression of insulin resistance and obesity-related metabolic disorders. Introduction of affordable animal sourced foods and nutrition education programs can improve these populations’ ability to thrive; especially for children and adults of advanced age</p>	
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<p>7.</p>		<p><b>Issue</b> - In 2018 the new “Farm Bill” or Agriculture Improvement Act of 2018 was passed by the federal government. This legislation allows landowners and operators to make several decisions which directly impact their profitability. Producers could update payment yields and then choose a price support program; the ARC (Agricultural Risk Coverage) or PLC (Price Loss Coverage) program. Operators and landowners need information and tools to assist with these decisions.</p> <p><b>Response</b> - The NDSU Extension farm bill website was updated with news releases, PowerPoint, video presentations, and decision aid tools. Training was provided by NDSU and FSA specialists. Farm bill presentations were made to over 270 agricultural lenders, over 160 crop insurance agents and several farm business management instructors. In-service training was conducted for Extension agents on the use of the decision tools. Many county meetings were held for the public by the local Extension agents. NDSU Extension agents used the decision aid tools to provide one-on-one assistance to help landowners and operators better understand their farm bill options and hosted public meetings as well.</p> <p>Impact - Approximately 2000 producers were reached through county-based Extension staff. Showing producers how to use decision making tools greatly increased their confidence in their ability to make educated decisions. Providing awareness of available choices increased producer’s motivation to seek out reliable information.</p> <p><b>Public Value</b> - Economically healthy farms and ranches are critical to sustainable and vibrant communities regardless of size across North Dakota. Informed decisions regarding the federal farm bill helps producers' profitability which in turn benefits our communities and the entire state.</p>	<p>Economic and Community Vitality</p>
<p>8.</p>	<p><b>Climate Risk Management</b></p>	<p><b>Issue</b> - Climate change is having two important impacts on North Dakota’s agriculture. One is for increased yield risk, or variability. Second is a change in the composition of the crops produced.</p>	<p>Economic and Community Vitality</p>

		<p><b>Response</b> - To address the latter, we recently completed two studies on issues of climate and cropping changes. We used data for the average length of crop growing season for four counties across North Dakota (Bottineau, Stutsman, Richland, and Divide) from the first decade of the 1900's through the 2017 crop year. We used the number of days between frost dates (last spring frost to first fall frost) as a measure of the growing season. Applying a standard normal homogeneity test (SNHT) to the data we found that the mean average seasonal length increased by an average of 20 days between the early decades of the 1900's to the most recent period. The tests indicated that the increase in frost-free days was highly significant (99% confidence level) for all four locations. This increase in the growing season length, combined with the development of shorter maturity varieties, has allowed North Dakota to greatly expand its corn and soybean production over the past three decades. Further empirical analysis examined the changes in the composition and geographic distribution of corn production. The results indicate that U.S. corn production is becoming less geographically concentrated in terms of state-level importance while the opposite holds true for soybean production. The results point towards the importance of irrigation in the geographic diversification of corn production. Our researchers have also developed decision tools to help mitigate climate in crop prices, crop yields, and production costs. These decision tools which are updated regularly as conditions change. These tools include the NDSU Crop Compare Tool, the Grain Storage Costs tool, the ARC-PLC-IC calculators, the Prevented Planting Analysis tool, the Insurance and Marketing Simulator, the livestock forage disaster calculator, and the Nitrogen Decision Tool. All of</p>	
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		<p>these tools are available online to the public and maintained as risk management aids for producers and agribusiness professionals.</p> <p><b>Public Value</b> - Taking steps to control the inherent risk of farming ensures a more sustainable business environment for agriculture producers, less volatility in farm incomes for the state, and ensures a stable and plentiful food for the nation.</p>	
<p>9.</p>	<p><b>Youth Gardens Lead to Health, Active Kids</b></p>	<p><b>Issue</b> - The children of North Dakota are its most precious resource, but they are undernourished and inactive. Surveys of high school children in North Dakota indicate 99% do not eat the recommended amounts of vegetables daily, 31% are overweight or obese, and 74% are not physically active on a daily basis.</p> <p><b>Response</b> - The NDSU Junior Master Gardener Program was established to address these concerns. In 2020, the program awarded \$22,500 to 46 gardening projects that educated 3,370 children across the state. The projects were designed by educators to address their local priorities (for example, promote health and wellness, develop skills in gardening, beautify towns or enhance food security). Partner organizations included schools, youth clubs, day care centers, senior centers, churches, and youth-at-risk programs.</p> <p><b>Impact</b> - A survey was completed by all project leaders at the end of the growing season. They reported their projects fostered:</p> <ul style="list-style-type: none"> <li>• Enhanced skills in gardening (100% of projects).</li> <li>• Increased physical activity (100%).</li> <li>• Stronger community partnerships (100%).</li> <li>• Healthier diets (93%).</li> <li>• Opportunities for community service (80%).</li> <li>• Increased food security in the community (74%).</li> <li>• Beautification of the community (61%).</li> </ul>	<p>4-H, Youth Development</p>

		<p>Other impacts were mentioned by leaders. They reported their children:</p> <ul style="list-style-type: none"> <li>• Donated 17,000 pounds of produce to needy families.</li> <li>• Developed self-esteem in their service to their communities.</li> <li>• Learned where their food comes from.</li> <li>• Learned the value of teamwork.</li> </ul> <p>Studies have shown that children who grow their own food are more likely to eat vegetables and have healthy eating habits throughout their lives.</p> <p><b>Public Value</b> - Youth garden programs provide hands-on activities that lead to healthy kids and strong communities.</p>	
<p>10.</p>	<p><b>Healthwise for Guys</b></p>	<p><b>Issue</b> - According to Centers for Disease Control and Prevention statistics, North Dakota men have a higher rate of skin, colon and prostate cancer than the national average. According to an online survey of men’s health concerns with 555 respondents, the four topics of greatest concern to the respondents were 1) cancer, especially colon cancer (53%), 2) high blood pressure (47%), 3) heart disease (44.5%) and 4) overweight/obesity (42%). Previously, NDSU Extension hosted 11 community forums to learn concerns in agriculture and associated programs, and children, families and community-related programs. In the area of health and wellness, forum participants indicated that nutritious foods and exercise programs are a priority within the health and wellness area. We also have been asked to reach younger adults (18 to 35), and these actively engaged men are part of the target audience.</p> <p><b>Response</b> - Prior to this, a men-specific health program did not exist, and the survey responses from men indicated their interest in a men’s health program. The “Healthwise for Guys” program includes a website, handouts, displays, presentations and men’s health tool kits, which have been used throughout North Dakota. In many locations, “Healthwise for</p>	<p>Human Development and Education</p>

		<p>Guys” programming is used in conjunction with the Pesticide Training program. To date, 1,525 have participated in the program.</p> <p><b>Impact</b> - Participants in the three cancer-related programs increased their knowledge, knew where to go for accurate nutrition and health information and were willing to share what they learned with others. In the sun safety program, about 98% of participants indicated their lifestyle had room for improvement and 98% would recommend the program to others. About 67% planned to wear SPF 30 sunscreen and 75% planned to do skin self-checks. In the colon and prostate cancer programs, 96% indicated their lifestyle had room for improvement and 96% would recommend the program to others.</p> <ul style="list-style-type: none"> <li>• 71% of respondents planned to eat more fruit</li> <li>• 71% planned to eat more vegetables</li> <li>• 57% planned to eat more whole grains</li> <li>• 57% planned to eat more beans/high-fiber foods</li> <li>• 56% planned to get more physical activity</li> </ul> <p><b>Public Value</b> – Improving health behaviors can increase quality of life and save millions of dollars in collective health-care costs for North Dakotans throughout their lifetime.</p>	
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