North Dakota State University
Hettinger Research Extension Center: 2020 - 2024 Strategic Plan

Mission Statement: *To serve the people of North Dakota with applied research and education in agriculture and environmental science that will enrich their lives and support economic development.*

1. **Evaluate alternative livestock production systems that increase profitability while maintaining environmental stability.**

- New technologies such as the National Sheep Improvement Programs (NSIP) use of Estimated Biological Values (EBVs) and genetic markers can improve profitability for sheep producers. However, many of these technologies have not been consistently utilized in western U.S. sheep flocks.
- As animal welfare concerns have increased for consumers, the evaluation of traditional management techniques and ways to mitigate animal stress is necessary. Quantifying stressful events for livestock through physiological responses is important to determine potential impacts on animal health, well-being, and productivity.
- Alternative feeds, or the evaluation of traditional feeds, is needed to make sure feeds are not negatively affecting reproduction or feedlot growth. Small changes in reproduction or in growth can have large effects on profitability.

RESEARCH PLAN:

Problem	***Proposed Research***
1. Utilization of new genetic technologies such as NSIP and genetic markers	a. Collaborate on genetic research for applicable traits for western U.S. sheep production b. Change ewe flock make-up to 50% Polypay and 50% Rambouillet c. Enroll flock in NSIP d. Collaborate with USDA/ARS on genetics research utilizing NSIP flock e. Evaluate carcass ultrasound for predicting lean carcass yield
2. Increased regulation of animal health products and animal welfare	a. Evaluating alternatives to antibiotics (i.e. probiotics, enhanced mineral products) in traditional livestock production systems b. Use of analgesics for castration, docking, etc.
3. Maximizing reproduction to increase profit	a. Less land and feed requires us to minimize fetal death loss. b. How do alternative feeds affect fertility?
4. A***lternative feedstuffs and technologies in lamb finishing***	a. Evaluate alternative feeds and management in lamb finishing.

OUTREACH PLAN:

Strategies	Target Audience	Timing
Provide research-based, non-biased educational materials and learning opportunities focused on nutrition and general livestock management	Livestock producers	Year-round
Collaborate with county-based Extension staff to coordinate and develop specific outreach events based on research efforts	Livestock producers	Year-round
Events		
Beef Day	Local	January – March
Beginners Sheep School	Starter Flock recipients and general public	September
Shearing and Wool Schools	Shearers – regional; Wool Classing – nationwide	November
Ram Test	Purebred breeders, specifically Rambouillet and Columbia	October - March
Sheep carcass ultrasound schools	Nationwide	Availability
Cattle and Sheep Research Report	ND cattle and sheep producers	Fall
NDSU Fall Conference	NDSU Extension Agents	Fall
NDLWPA and Stockmen's Association Annual meetings	ND sheep and cattle producers	Fall
Agri-International Trade Show	General public and producers	February

NEEDS:

1. New facilities for animal handling and outreach activities
2. Individual animal feeding systems for sheep research and ram test outreach
    a. Portable SmartFeed Trailer to monitor individual supplement and/or mineral intake
3. Livestock research technician

2. Conduct applied research that investigates the compatibility of agriculture and wildlife.

The expectations placed on our limited land resource expand daily as a direct result of population growth and human wants and needs. As the earth's population has now surpassed 7.7 billion and is climbing, we will continue to depend on agricultural producers to feed the masses. In the United States, momentum continues for the production of food to occur in a manner that is environmentally sound and results in food that is both safe for consumption and reasonably priced. Therefore, agricultural producers are tasked not only with feeding society but also are held responsible for maintaining America's land resource, much of which is under private ownership. To this end, producers may need to finetune current practices and develop alternatives that maximize food production in a manner that maintains North Dakota's natural resource base. Research is needed that can identify agricultural practices that benefit the environment, but also can determine which practices are negatively impacting the environment. By developing knowledge, we can foster beneficial practices on the land and evaluate alternative methods to mitigate for negative outcomes when they occur.

RESEARCH PLAN:

Problem	***Proposed Research***
1. Grassland loss continues at an alarming rate.	a. Grazing strategies that can improve profitability b. Cover crops and annual forages c. Integrated systems d. Native plantings – an integrated approach
2. Populations of native and non-native pollinators have declined or face adversity.	a. Evaluate how different land uses impact pollinator populations. b. Identify landscapes that are more beneficial for pollinators
3. Agricultural practices are not always compatible with the needs of wildlife including game and non-game species	a. Develop and evaluate methods to improve the compatibility of agriculture and wildlife b. How do current management practices influence species of federal and state concern?
4. Unmanned aerial air-craft have become more available to the public, but their utility to wildlife and range sciences are not well understood or developed	a. Access floristic resources at a landscape scale b. Incorporate the use of unmanned aerial air-craft into monitoring protocols for wildlife

OUTREACH PLAN:

Event	**Target Audience**	**Timing**
Field Day	Local	July
Beef Report	ND Livestock Producers	June-September
ND Society for Range Management	NRCS, Landowners, Rangeland Managers	Fall
ND Wildlife Society	NRCS, Landowners, Wildlife Managers	February
Sheep Research Report	ND Sheep Producers	Fall

NEEDS: Larger land base for research efforts

3. Evaluate weed control methods to increase crop and forage productivity in southwest North Dakota.

Annual and perennial weeds limit the economical production of crops and livestock. Weeds reduce crop and forage production and quality through competition for resources, such as light, nutrient, and soil moisture. The impacts of no-till crop production systems commonly used in western North Dakota have had positive impacts on reducing soil erosion, increasing soil organic matter, and preserving soil moisture. However, it has also increased reliance on postemergence herbicides for weed control. Over-reliance on any method of weed control often results in weed populations that are resistant to these methods. With fewer new herbicides being registered, there is an increased need preserve the ones we currently use and carefully utilize new herbicides or herbicide resistant traits when they become available. In this research plan, research will be planned and conducted in crop and forage production in western North Dakota to identify ways to improve weed control methods with current and new herbicides and how best to utilize new herbicide resistant traits as they become available.

RESEARCH PLAN:

Problem area	Proposed Research
1. Identification of methods for controlling winter annual weeds in annual crops and forages	a. Evaluate fall herbicide applications for control of difficult winter annual weeds b. Evaluate spring burndown treatments for controlling winter/spring annual weeds
2. Minor crops grown have few options for weed control	a. Evaluate new and existing herbicides for crop safety and weed control in crops such as field pea, chickpea, lentil, flax, etc. b. Evaluate herbicide carryover injury to minor crops.
3. Introduction of new herbicide resistance traits	a. Evaluate methods to best utilize herbicide resistant traits in crops such as canola, soybean, corn, alfalfa, etc. b. Evaluate herbicide tank-mixes, especially mixes including soil-active herbicides, for compatibility, weed control, and crop safety.
4. Winter annual weeds reduce value of forages for hay production and grazing	a. Evaluate herbicides that could be used to control winter annual weeds in forage crops. b. Evaluate impact of winter annual weeds on forage quality.

OUTREACH PLAN:

Event/Publication	Target Audience	Timing
Wide World of Weeds Workshop	Statewide farmers, ranchers, and agribusiness groups	Jan
Weed Control Research Report	Statewide farmers, ranchers, and agribusiness groups	Jan
NDSU Weed Control Guide	Statewide farmers, ranchers, and agribusiness groups	Jan
Winter County Agent Meetings	Local and regional farmers, ranchers, and agribusiness	Jan-Mar
Western Society of Weed Science	Regional weed science professionals meeting	Mar
HREC Crops Field Day	Local and regional farmers and agribusiness	July
Western Dakota Crops Day and Book	Local and regional farmers and agribusiness	Dec

NEEDS:

1. Collaboration with other weed scientists at regional RECs and on campus
2. Increase land base for rotating research trials
3. Graduate students or summer interns

4. Enhance dryland crop production while maintaining natural resources.

Recent drops in commodity prices along with stable or increase input costs, has placed additional constraints on profitability. Continuing advances in technology have resulted in improvements in yield potential, pest management, and quality of crops grown. However, new production constraints are constantly arising. For agriculture to remain a viable industry in North Dakota, producers must have access to crop and cultivar diversity, plant protection, and management practices to meet current and future economic and environmental challenges while preserving our natural resources for future generations. Identification and adaptation of superior crop cultivars and crop production practices has had and will continue to have a positive economic impact on our region. This project will strive to conduct relevant research designed to enhance productivity, competitiveness, and diversity of agriculture across western North Dakota.

RESEARCH PLAN:

Problem	Proposed Research
1. Maintaining profitability with increasing costs of crop inputs and land.	a. Economic fertilizer rates. b. Cultural practices that reduce pesticide and fertilizer use. c. Finding the best yielding crop cultivars.
2. Continued loss of topsoil and nutrients.	a. Improved no-till practices. b. Evaluate cover crop options to incorporate into rotations to improve soil health.
3. Maintaining crop diversity.	a. Alternative crops, Biofuel crops. b. Companion cropping c. Evaluate cover crops and annual forages for grazing and forage.
4. Crop cultivars adapted to western Dakotas.	a. Variety testing of major and minor crops grown in the region. b. Planting yield trials and early generation screening nurseries for breeding programs of crops important to western Dakotas.

OUTREACH PLAN:

Event	Target Audience	Timing
Western Dakota Crops Day and Report	Regional Producers, Agronomists	December
County Crops Meetings	Local Producers	January, February
Hettinger Summer Field Tour	Local Producers, Agronomists	July
Off Station Variety Trial Tours – 2 locations	Local Producers	July
Friends & Neighbors Day, Area 4 Farm USDA-ARS Mandan	Local Producers	July
County Extension Agent Trainings, Field School, Fall Conference	Regional County Extension Agents	Summer, Fall

NEEDS:

1. Increased collaboration with regional research programs; REC's, NDSU Fargo, USDA-ARS and regional land grant universities.
2. New plot sprayer.

5. Integration of Livestock, Wildlife, Agronomy, and Weeds research programs into a farm-scale interdisciplinary research project.

Land values continue to increase in SW ND, placing both crop and livestock producers in the precarious situation of increasing the economic output of owned and rented lands. However, maximizing production in cropping and grazing systems has potential unintentional consequences, such as new weeds to manage, herbicide resistant weeds, and potential negative effects on wildlife habitat. However, livestock grazing and cropping systems can be mutually beneficial when evaluated in a sustainable system designed for the region. The Hettinger Research Extension Center will attempt to design a short-term and long-term cropping and grazing research project to maximize profitability, while maintaining ecological stability.

Short- and long-term goals:

Short-Term Goal: Develop a short-term pilot project evaluating the interaction of winter wheat grazing by livestock, cover crops, and weed management systems.
Long-Term Goal: Develop a farm scale research project evaluating cropping systems and livestock grazing.