

For the Land and Its People

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The definition of the word “enhance” is to amplify, strengthen or increase the value of something. NDSU Agriculture is purposefully working to enhance and strengthen educational opportunities, quality of life, food systems and our state’s resources for generations to come. This issue of For the Land and Its People highlights the efforts of the College of Agriculture, Food Systems, and Natural Resources (CAFSNR); North Dakota Agricultural Experiment Station (NDAES); and NDSU Extension to enhance our mission.

Enjoy.

Greg Lardy

Vice President for Agricultural Affairs

NDSU NORTH DAKOTA
STATE UNIVERSITY

College of Agriculture, Food Systems, and Natural Resources
North Dakota Agricultural Experiment Station
NDSU Extension

Tractor Safety Camp Inspires Confidence in Participants

The National Children's Center for Rural and Agricultural Health estimates a child dies about every three days because of an agriculture-related incident.

NDSU Extension is preparing youth to work safely on the farm/ranch. During the summer, Extension specialists and agents held youth Tractor Safety Camps in Fargo and Washburn training 30 youth.

"Oftentimes, I hear about the sad outcomes," says Angie Johnson, NDSU Extension farm and ranch safety coordinator. "Tractor Safety Camp is helping to change the narrative for farm families."

Held over the course of three days, each camp provided tractor certification under the Hazardous Occupations Order in Agriculture. This federal law requires youth who plan to work for a farmer/rancher other than their family to become certified.

While driving a tractor safely is a large part of the camps, other safety topics included ATV safety, learning to stop bleeding in an emergency, livestock handling, electrical line safety, power take-off safety, and farm/ranch mental health and stress.

Fargo camp participants were trained in the Stop the Bleed program with Sanford Health, which focuses on how

to use a tourniquet to help stop an injured person from bleeding out. Washburn camp participants were trained in CPR techniques by the Washburn Emergency Management Service.

Trace Thompson, a camp participant, wanted to learn how to make smart choices on the farm. "A friend went with me, and we talked about how it would work at home," says Thompson.

"After attending Tractor Safety Camp, our son is very cognizant of farm safety and has made us all stop and talk about the scenario, what we might need to change or discuss how we could do it more safely," says Jennifer Jewett, mother of Thomas Jewett, a camp participant.

"I want youth to be involved on their family farms, but I don't want them to become a statistic," says Johnson. "Our team of Extension agents and specialists, safety experts and the businesses that support these camps are all invested in making sure family farms continue to thrive by giving youth the tools they need to farm safely for generations to come."

FOR MORE INFORMATION:

<https://www.ndsu.edu/agriculture/ag-hub/ag-topics/farm-safety-health>
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Beef Cattle Research Complex Extends Classroom Beyond the Main Campus

Some of the largest NDSU classrooms that offer students opportunities to learn and develop real-world skills exist just west of the main campus. Take a drive along Fargo's 19th Avenue North, and you'll find the NDSU Department of Animal Sciences' (ANSC) animal units and NDSU's Beef Cattle Research Complex (BCRC).

The complex, dedicated in the summer of 2011, can accommodate up to 192 cattle. It consists of a feeding area, cattle handling system, calving pens, an office and laboratory, and mixing and feed storing facility. Fewer than six facilities of this caliber exist in North America.

A computerized feeding system allows researchers to study individual feed intake and feeding behavior.

The state-of-the-art cattle handling system allows researchers to weigh and process cattle, and take a variety of samples with low-stress to the animal.

"Both undergraduate and graduate students are learning how to carry out high-level research protocols and conduct industry-leading research," says Kendall Swanson, NDSU ANSC professor who oversees the complex.

"The facility provides students taking Animal Science and Veterinary Technology courses an opportunity to work with cattle and learn good animal-handling techniques in a properly designed animal-handling system," says Swanson.

Brooke St. Germain, a Fargo-native and third year student at Iowa State University College of Veterinary Medicine, appreciated the hands-on learning at the BCRC, during her time as a student in the NDSU Veterinary Technology degree program.

"I didn't grow up on a farm or ranch," says St. Germain. "NDSU gave me opportunities to get essential experience working with large animals in my classes and as a student employee."

"The beef cattle research complex is just one of the many facilities that enhance and strengthen students' education while they are here at NDSU," says David Buchanan, NDSU College of Agriculture, Food Systems, and Natural Resources (CAFSNR) associate dean. "I think CAFSNR is unique in that we prioritize and recognize the value of hands-on and practical learning opportunities."

FOR MORE INFORMATION:

<https://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/facilities/beef-cattle-research-complex>
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HREC Aims to Understand How Honeybees Use Shelterbelts

Each year in May, honeybees begin to return to North Dakota from around the nation where they have been pollinating crops. North Dakota lacks floristic resources for honeybees in early spring. Therefore, beekeepers generally feed their bees, which is an added cost.

“Bees are big business in North Dakota,” says Benjamin Geaumont, Hettinger Research Extension Center (HREC) specialist for wildlife and range research. “North Dakota is the largest producer of honey in the U.S.”

Shelterbelts established throughout much of the Upper Great Plains to conserve soil and provide shelter for wildlife and humans typically include early-season flowering trees and shrubs, which may provide resources for honeybees.

Geaumont and other personnel at NDSU’s main campus and the Northern Prairie Wildlife Research Center in Jamestown are aiming to understand how honeybees use shelterbelts, whether shelterbelts impact the health of the colony, and what specific trees and shrubs are preferred by honeybees.

With a grant from North Central Sustainable Agriculture Research and Education, and with the help of private landowners and private beekeepers, the researchers began their data collection in 2020.

Researchers identified apiaries to evaluate based on the surrounding tree and shrub cover. Four colonies per apiary were selected for study based on colony health assessments. Two hives were set on scales with weight measured hourly throughout the summer. Hives increasing in weight signaled that the colony was producing more honey and producing more worker bees. The other two colonies were set on pollen traps to understand what plants the bees were foraging on during the early-season (mid-May to June). To date, nearly 280 colonies from 70 apiaries across central and southwest North Dakota and northwest South Dakota have been monitored as part of the study.

Preliminary data suggests that trees and shrubs in shelterbelts are used by honeybees. Pollen data suggests that honeybees forage from a variety of plants during the early season, including dandelions, lilac bushes and chokecherry trees.

“The research is ongoing,” says Geaumont. “We hope to provide beekeepers with information that will help them determine where to place bees to take advantage of early season floral resources and make planting recommendations to soil conservation districts and landowners so that pollinator habitat is considered when establishing shelterbelts.”

FOR MORE INFORMATION:

HREC Honeybee Research Video — <https://youtu.be/jOWaQ-DChLA>
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NDSU Plant Breeding Programs Using UAVs to Improve Efficiency



North Dakota State University crop breeding programs are of critical importance as they focus on developing improved varieties specifically adapted for North Dakota and surrounding states.

“A released variety combines many of the desirable traits of economic importance for a specific crop,” says Juan Osorno, NDSU dry bean breeder. “However, plant breeding is a multi-year, long-term effort requiring multiple steps including hundreds of crosses annually, evaluations at multiple locations, and selection of superior genetic material. The breeding pipeline can be a cumbersome and tedious effort to find a breeding line with all desired traits. Nonetheless, the contributions of plant breeding to crop productivity are widely demonstrated.”

Plant breeders are constantly looking for methods and tools to improve selection efficiency. Basic genetics, genomics, agronomy, physiology, pathology and entomology, among others, have improved the selection process.

Marker Assisted Selection (MAS), high throughput genotyping and evolving genomic tools allow breeders to track some specific genes of economic importance within the breeding pipeline. The current bottleneck for efficient selection in a breeding program is the need to manually measure all these traits of interest in thousands of lines (and across multiple locations). This is technically known as phenotyping.

With a grant from the North Dakota Agricultural Experiment Station, a multidisciplinary group of NDSU plant breeders, NDSU Agricultural and Biosystems Engineering (ABEN) faculty and graduate students are working on the potential application of precision agriculture tools into their breeding programs.

“In dry beans for example, the goal is to use Unmanned Aerial Vehicles (UAVs) to regularly collect data over breeding trials for traits such as emergence, plant height, canopy closure, days to maturity and foliar diseases, among others,” says Maria de Oliveira, NDSU Department of Plant Sciences graduate student.

The pea breeding project is testing the utility of a UAV for assessing foliar damage in dry pea caused by *Fusarium* wilt under field conditions,” says Sai Manogna Adapa, an NDSU ABEN graduate student. “Similar efforts are underway within the potato breeding program, while the soybean program is collecting UAV-obtained data of progeny row canopy closing rates as a predictor of yield.”

In addition, a field robot, driving under the canopy of the crop, is being used to measure traits that are difficult to detect with UAVs such as pod count per plant and stem thickness. Another use for robots is to measure the “under-canopy” temperature in potatoes, which may be correlated with disease incidence.

“Findings of this research may also have application in other agricultural management practices in large-scale crop production, like models based on aerial observations predicting when and where to apply disease management and yield estimates during the season,” says Hans Kandel, NDSU Extension agronomist.

Data from multiple locations and years will be needed to develop robust prediction algorithms.

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Tai Ji Quan Program Enhances Quality of Life for Aging Adults



Many communities in North Dakota are looking for ways to help older adults maintain their health and independence. Recognizing the need for services, NDSU Extension began offering Tai Ji Quan: Moving for Better Balance, a national evidence-based program designed to improve strength, balance, mobility and daily function, reducing participants' risk of falling.

The Tai Ji Quan: Moving for Better Balance program has a foundation in martial arts but has been modified for falls prevention. Research shows that the program enhances quality of life and is more effective at reducing falls than conventional exercise approaches. It also provides stress relief and has additional therapeutic benefits for patients with Parkinson's Disease and other mobility impairments.

"Survey results indicate that 60% of participants report that the class helped them improve overall in the activities of daily living," says Jane Strommen, NDSU Extension gerontology specialist. "This is important because maintaining functional capabilities helps individuals to remain independent."

Classes are offered in a fun, relaxing environment. Participants learn eight tai ji quan forms plus variations for therapeutic value.

Sue Milender, NDSU Extension agent in Barnes County, has offered Tai Ji Quan: Moving for Better Balance several times in the Valley City area based on high demand. Past participants continue to ask for refresher courses and more sessions.

"I was surprised by the engagement and excitement of participants," says Milender. "I think it's a testament to the value this program has and word of mouth from participants who have noticed real benefits in their life."

Since its implementation in North Dakota, Tai Ji Quan: Moving for Better Balance instructors have offered eight classes and reached 100 individuals. More classes are being planned at sites across the state.

Funding for the instructor certification was provided by the North Dakota Department of Human Service, Division of Aging Services.

MORE INFORMATION:

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NDSU's Land-Grant Mission

The College of Agriculture, Food Systems, and Natural Resources has a tradition of excellence in educating students for real-world careers. Our students learn from and work with world-class scientists in state-of-the-art facilities. These interactions, along with a relatively low student-faculty ratio, provide opportunities for students to develop their critical thinking skills, to work in a team setting, and to capitalize on hands-on learning experiences that will allow them to be competitive in a global economy.

The North Dakota Agricultural Experiment Station consists of seven Research Extension Centers placed strategically throughout the state, the Agronomy Seed Farm in Casselton and the Main Station in Fargo. We work to develop techniques and technologies to enhance the production and use of food, feed, fiber and fuel from crop and livestock enterprises.

NDSU Extension empowers North Dakotans to improve their lives and communities through science-based education. We serve all people of the state through our 52 county and Fort Berthold offices, seven Research Extension Centers and the main campus in Fargo.

For more information on the programs in this publication, contact the faculty and staff listed. For more information about our other programs or have questions, comments or suggestions, please contact me.

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N.D. Civil Engineer Attributes Career Preparedness to 4-H Experience

Mandan native Kaylin Tomac credits her 15 years of involvement in North Dakota 4-H with preparing her for her career and life after college.

Now working as a civil engineer in Bismarck, Tomac graduated from NDSU with a degree in civil engineering in the spring of 2021. She was active in 4-H from the moment she joined as a Cloverbud through her time as an elected state 4-H Ambassador, leading events and promoting 4-H along with other young adult members from across the state.

She says 4-H helped her gain valuable public speaking skills, become a savvy consumer and learn to operate in professional settings.

"I've always attributed my communication, people and general life skills to 4-H," says Tomac. "The experience of coming up with ideas, creating the projects and going to the fair to be interviewed about them was very impactful."

Though Tomac admits she felt timid during judging interviews as a Cloverbud, with practice the interview eventually became one of her favorite parts of showing her 4-H projects.

"As I interviewed for internships throughout college and a post-grad job, I noticed that while I was always nervous, I was also very confident and excited," Tomac says. "I was able to think on my feet and answer questions thoroughly. I truly believe that my confidence came from the experiences I had during my time in 4-H."

Her 4-H project interviews also prepared her to receive and learn from constructive criticism. She grew to appreciate that the judges offered her valid points on how to improve for the future.

"As a young engineer, I get lots of constructive criticism," says Tomac. "Being able to take constructive criticism and understand where it is coming from has helped me greatly in my career so far."

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