

Envision

Agriculture



Is your future in Agriculture?

If so, the North Dakota University System has a field of options for you. As a state with a foundation as solid as bedrock in agricultural production, and a major research university focused on it, you'll find plenty of details inside to learn which of our 11 public colleges and universities - and their many ag programs - are right for you.

Details about Ag-related programs can be found inside that provide real-world examples of what types of courses are available, how schools partner with business and industry to deliver them, who teaches them and what students can do once they graduate with these new sets of knowledge, skills and abilities.

Agriculture & Higher Education

Since the North Dakota Agricultural College was founded in 1890, North Dakota's higher education system has sought to meet the need for our agricultural producers to have access to the highest-quality applicable education possible.

From that time on, the land-grant institution – known as North Dakota State University since 1960 – has led the way for ag-based education, both in the Midwest and throughout North Dakota.

In addition to NDSU providing a wealth of ag programs, and only ag-research university in the state, many other programs exist throughout the North Dakota University System's 11 public colleges and universities. For instance, Dakota College at Bottineau is well-known for its work in forestry and horticulture – both fields integral to creating positive ag returns.

But, DCB also has a growing aquaponics program that aims to foster growth in non-traditional growing areas like greenhouses and indoor nurseries.

Dickinson State University in the western part of the state, agriculture students can get in-

depth knowledge on numerous ag studies like ag sales, agri-business, and studies in equine, geographic information systems, soils, and farm and ranch management.

All of these topics are essential to the overall wellness of the agriculture backbone of North Dakota's history and economy.

Likewise, students wanting to learn more about agriculture can find the Agriculture, Technology, Food and Natural Resources program at Bismarck State College; the Precision Ag program at Lake Region State College (learn more on page [_](#)); the Ag Business program at North Dakota State College of Science; and the Agriculture Business and Industry program at Williston State College.

Our university system has grown to include many programs in and outside of our famed agriculturally-focused school because the need in our state is high.

And the needs of agriculture keep changing. It wasn't that long ago that family farms dotted the landscape, each with a team of horses and farm implements that would now be considered rudimentary. Nowadays those family farms have grown and

combined into larger operations.

The teams of horses might still be around, but their work is being done by tractors and combines.

Within each of those technologically advanced machines and all the implements they can connect to are electronics and digital applications meant to increase the output of a farmer's work, all while lowering the work load.

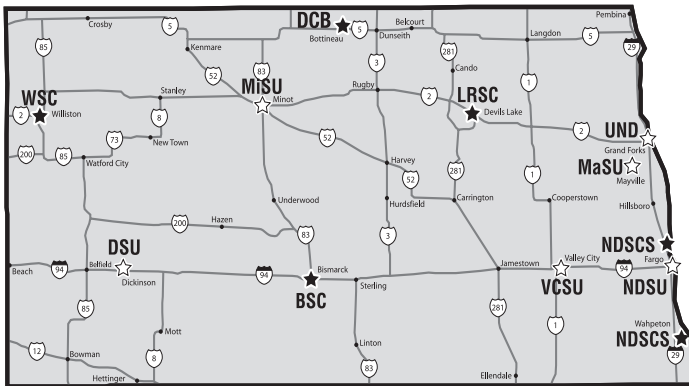
The same can be said for dealing with livestock or crops. The agricultural sciences and business associated with them have developed over time.

While some of the best practices our farming and ranching ancestors may have used can still

be considered today, new best practices have made it easier to keep ag production moving steadily forward to feed America – whether it's putting beef, milk, or bread on the table.

This is where agriculture intersects with higher education – the place where new best practices can be distilled down to the next generation of ag producers, or even those who want to add to their skillsets in changing times.

That's the reason for this publication, as well: To provide some insight on how high school students interested in agriculture may prepare for a future that's changing rapidly, and reminding them that they can do so right here in North Dakota.



Key: ★ = Two-Year Colleges

★ = Four-Year Universities

- Bismarck State College (BSC)
- Dakota College at Bottineau (DCB)
- Lake Region State College (LRSC)
- North Dakota State College of Science (NDSCS)
- Williston State College (WSC)

- Dickinson State University (DSU)
- Mayville State University (MaSU)
- Minot State University (MiSU)
- North Dakota State University (NDSU)
- University of North Dakota (UND)
- Valley City State University (VCSU)

Why Envision?

Envision 2030 set out in 2016 to learn what our university system needed to do to make sure our graduates were getting the educations they desired for themselves and that were required to become successful in their fields. Ten Advisory Teams were created. The Ag-focused team, made up of experts from around the state, made detailed findings.

The team noted that agriculture continues to undergo rapid change thanks to global positioning systems, autonomous drive, and unmanned aerial systems. Additionally, global economics, world trade, and changing consumer preferences created new opportunities for farmers in the region while at the same time increasing risk and volatility at the farm gate.

According to the experts on the Ag Team, these changes created opportunities for NDUS students interested in careers in agriculture and food production.

Nationwide, demand for agricultural graduates is strong and the number of job openings is predicted to outstrip the number of graduates in the coming years, according to a Purdue University report. That means agriculture graduates should be able to find quick placement once they've reached the "harvest" of their own student career: graduation.

Our Ag Team and university system know one thing for certain: Student interest in agriculture in North Dakota is strong. A record number of high schools across the state of North Dakota now have 84 FFA chapters and a membership of more than 5,400. Thanks to that interest, they should be ready for what's next.

More opportunities will spring up as the older generation retires, paving the way for recent graduates to apply their knowledge in the field.

ENVISION  **2030**

A few things changing Ag:

- Global economics/trade agreements
- Changing weather patterns
- Technological revolution
- Farm profit potential
- Growing consumer interest in food production
- Increasing regulation

Skills Ag graduates need:

- Technical expertise
- Critical thinking skills
- Problem solving skills
- Communication/interpersonal skills
- Financial/marketing skills
- Ability to adapt to change
- Emphasis on lifelong learning

Finding the right fit for you

Eleven possible colleges and universities to choose from may seem like a big decision. It's likely that you may already be settling on a few top choices - either in institutions or the programs that you want to go into. If you're having trouble deciding, here's some more information.

Our institutions are split up into two-year colleges and four-year universities, each with a unique mission and character. You can learn more about each individual school at NDChoose.com/colleges/.

Why so many options? It takes a diverse set of campuses, programs and instructors to deliver to our huge agricultural need. According to the National Agricultural Statistics Service, there are 30,000 farms and ranches in the state producing a wealth of our nation's food. That includes plenty of operations that lead the nation in 11 different agricultural commodities. Additionally, North Dakota is in the Top 10 for 16 more commodities.

What's that mean? It means our Ag industry and economy need to have the best trained graduates possible. Thanks to a strong history of participation in 4-H and FFA, and the work of teachers throughout K-12 and the Career and Technical Education, our state's student body has a great start in learning about the many ag-related topics, from identifying crops to judging livestock to maintaining equipment, and figuring out when is the best time to buy and sell commodities. In any field there's always room for growth. In the following pages we'll show you how that is happening, right here, right now.

Taking care of the farm and the ranch at BSC

At Bismarck State College, agriculture is one of the programs that receives special attention. As the third largest campus in the university system and the one centralized to the state, it's no wonder.

Instructors have been teaching new and returning students on such topics as Agronomy and Farm & Ranch Management for years. Recently, the college has begun offering new options for students through distance education. In order to meet the need of today's students and ag producers, BSC knows how to deliver courses that people want, when and where they want them.

Farm and Ranch Management

This option is for those who plan on managing a crop or livestock production operation. For students who want to learn to be successful managers, to gain the ability to deal with the challenges of today's agriculture industries. Students will spend time hearing about agriculture finance, precision farming, crop/soil science and livestock production. Instruction on and with technology will be ever-present on everything from precision farming tech to fertilizer/pesticide scheduling apps and business applications.

Preparation

Students should be resourceful, flexible, creative problem solvers, interested in technology, and enjoy continuous learning. The following background is helpful: high school or college courses in agriculture, science and math, and experience working on a farm or for an agriculture-related business. Interested students are encouraged to apply early, as openings are limited.



Dakota College Aquaponics

Aquaponics.

There's a few constants in life, and a couple of them are that the population is growing and it needs to eat,



DAKOTA COLLEGE
AT BOTTINEAU

even with less land to do it. At Dakota College at Bottineau, they're figuring out more and more ways to grow plants in all kinds of conditions.

Through Aquaponics, students will learn how to take careful advantage of their environment to grow plants where there is no soil.

Aquaponics is the combination of aquaculture, the production of marine and freshwater aquatic plants and animals, and hydroponics, the science of growing plants in water or a media other than soil.

The program teaches students how to build, operate and manage an aquaponics system.

Why study Aquaponics? Students work and study in a learning environment that will focus on problems, critical questions and case studies forming the basis for a comprehensive understanding of aquaponics.

Career choices

- Aquaponics production manager
- Commercial greenhouse production manager or technician
- Aquaculture manager or production technician
- Controlled agricultural environment technician
- Fisheries technician
- Aquatic system designer assistant
- Aquaponics greenhouse technician
- Hydroponics manager or technician

Many options at DSU

At Dickinson State University, the Department of Agriculture and Technical Studies offers numerous options for students seeking an education in agriculture.

The department's stated mission is to be a leader in developing the human capital necessary to create and maintain agricultural systems, landscapes and communities that are economically and environmentally sustainable in southwestern North Dakota and across the region.

Not only does the four-year university offer designated courses for a Bachelor of Science in Agricultural Studies, it also offers an Associate of Science in Agricultural Sales and Service, which is just the beginning of the options for any prospective student.

There are numerous options within the BS degree as well, including: Business/Marketing, International Agri-Business, Integrated Farm Management, Integrated Ranch Management, Natural Resource Management, Range Management, Soil Science, and Equine. In the AS degree, options include Agricultural Business Management, Natural Resources, Production Agriculture, Technology in Agriculture, Equine Management, and Equine Training.

In addition to the wealth of these options for the majors, minors in Agri-Business, Equine, Geographic Information Systems (GIS), and Soils can help round-out a student's education.

Plus, a certificate program in Farm and Ranch Management and a Certificate of Completion in Horse Production can be a perfect fit for students coming back to school who want to enhance their knowledge base.



Precision at Lake Region

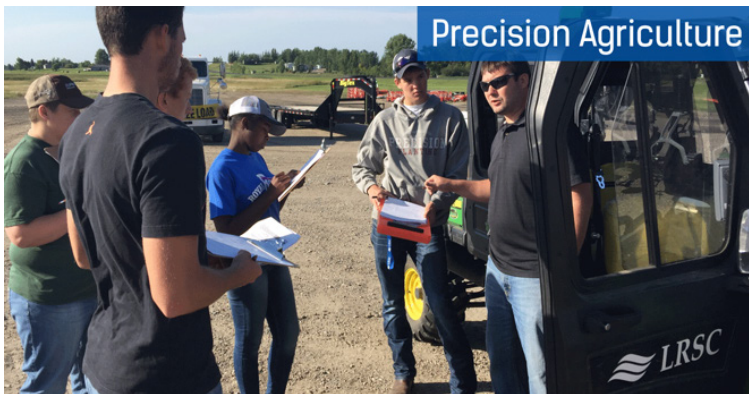
As technology continues to progress, the applications and methods surrounding it will too, in all industries. Agriculture is no different, something Lake Region State College knows very well.



The Precision Agriculture program offers core classes to include both theoretical and practical applications with extensive lab and hands on training, as well as general education requirements. Graduates are employed as precision technicians at implement dealerships, agronomy centers, independent precision service providers and many more.

The demand on farmers to continuously produce more food, fiber, fuel and pharmaceuticals has made it increasingly necessary to become more efficient. The need for efficiency has spurred the adoption of various forms of precision agriculture technologies. The variability in North Dakota soil and other northern plains states demands that fields be managed as small areas and treated differently according to their individual characteristics. The technology that precision agriculture offers collects immense amounts of data that assists in making field management decisions.

Students will learn skills in: General agronomy, Crop production, Soils and soil fertility, GIS and GPS.



Expertise, options at NDSU

At North Dakota State University, agriculture is a major program. It's no wonder, since the school was founded with the purpose of teaching agriculture in the 1890s. Nearly 130 years later, their programs are more encompassing than ever.

Undergraduate and graduate programs in the Departments of Agribusiness and Applied Economics, Agricultural and Biosystems Engineering, Animal Sciences, Microbiological Sciences, Plant Pathology, Plant Sciences, and the School of Natural Resource Sciences provide a wide array of majors that lead to very diverse careers relating to agricultural business, production and science as well as the food industry and aspects of natural resources management.

These academic units are also homes for scientists working with the North Dakota Agriculture Experiment Station and NDSU Extension. This means that students have the opportunity to be directly involved in ground-breaking research and to learn about how this research is used to provide evidence-based recommendations for agricultural producers and consumers.

The undergraduate majors include many of the traditional majors that are associated with agricultural production: Animal Sciences, Crop and Weed Sciences, Equine Science, General Agriculture and Horticulture. They also include majors that are business oriented: Agribusiness, Agricultural Economics and Economics.

There are majors that are specifically science oriented: Microbiology and Biotechnology and those that apply directly to the considerable opportunities that exist in the food industry: Food Science and Food Safety. Care and management of our natural resources are featured in three majors: Soil Science, Range Science and Natural Resources Management. The Agricultural Systems Management major has a focus on equipment, precision agriculture, and nutrient management and the Veterinary Technology major provides the opportunity for licensing as a Veterinary Technologist within a full four year degree program.

Students in the College of Agriculture, Food Systems and Natural Resources at NDSU have the opportunity to engage in many activities and programs that expand upon the classroom experience. Many students take advantage of internships during their college career. The college sponsors over 30 different student organizations which provide the opportunity for networking, leadership development, professional growth and the chance to explore

the variety of careers which exist in our majors. There are also numerous international programs and study abroad opportunities. Students who study abroad are uniform in declaring that it is a life-changing experience. Recent international study programs have visited places such as Ireland, China, Italy, Uganda and Puerto Rico.

Students studying in these programs also compete for a variety of scholarships which are managed by the College of Agriculture, Food Systems and Natural Resources as well as the departments within the college. In total, students in this college are awarded about \$400,000 in scholarships each year.

The facilities at NDSU are outstanding. One example is the Department of Agribusiness and Applied Economics Commodity Trading Classroom that is specifically designed to allow students to have real-time access to information pertaining to commodity trading. In addition, the association with the North Dakota Agriculture Experiment Station means that students can participate in research at the Agriculture Experiment Station Greenhouse Complex, which is one of the top research greenhouses in the world, and at the Beef Research Complex which has equipment that is only available at four other facilities in North America.

Career Opportunities

Employment opportunities for students in the various agriculture-based programs remain strong. Generally, the demand for graduates from the College of Agriculture, Food Systems, and Natural Resources exceeds the number of available graduates. Employers indicate that the most important characteristics desired in graduates include excellent oral and written communication skills, ability to meet and work with people under a variety of conditions, initiative, and work ethic. The Career Center reports that well over 90 percent of graduates in this college are able to secure appropriate employment at, or shortly after, graduation.

Partnering with industry

Advances soar when industry and education work together.

Such partnership is visible in a 40-acre field north of Lake Region State College in Devils Lake. Here, the college's Precision Ag program students have planted, tested, treated, and harvested its first corn crop.

Thanks to support from regional Cenex Harvest States, the Dakota Precision Ag Center (DPAC) at Lake Region State College has been able to take its DPAC 40 and make a learning tool for students, said Preston Sundeen, director and faculty for the Precision Ag program.

The Precision Ag program at LRSC offers an immense focus on experiential learning. Students work on everything today's producers touch: equipment, soils, inputs, drones, marketing, and software.

"Raising a crop on the DPAC 40 gave students real-life experience and a live learning lab and Cenex Harvest States helped make it a reality," he said.

Local Cenex Harvest States representatives worked with LRSC Precision Ag students and faculty throughout the year from planning, field preparation, planting, observing, chemical application, and harvest. The Precision Ag program also was able to work with test plots throughout the region in Penn, Webster, Edmore, Langdon, Doyon, Lakota, and Devils Lake

CHS is committed to strong community ties and welcomes the opportunity to advance ag education.

"The precision program at Lake Region State College shows the dedication to agriculture and CHS values the opportunity to help students learn for the future of Agriculture," said Jeremy Safranski, CHS sales manager.

This year's harvest project wasn't a textbook scenario as the 2017 growing season presented students with real-life challenges, Sundeen said.

Harvest became a race against the clock and Mother Nature. As snow entered the forecast earlier this fall, the students learned about beating the weather. Students also handled the pressure of running low on storage. With trucks full, the last load was put in the precision ag program's shop floor with tables acting as bunkers to keep the pile of corn in one spot.

All in all, the partnership proved to be a big benefit to student learning.

“We have 40 acres of land that students can write prescriptions for, conduct soil and crop sampling, configure variable application rates for fall fertilizer... it’s a place where students can experience the whole growing cycle. So much of what we do here is thanks to that 40 acres of crop,” Sundeen said.

These opportunities along with internships give students an advantage when heading into the workforce.

“The Precision Ag program at LRSC is so much more than classroom activities and theory. We put the kids in the simulators, labs, greenhouses, and in the fields to experience every aspect of raising crops. The more we can expose students to all aspects of precision agriculture, the better prepared they are for their future careers,” Sundeen said.

And in the end, the partnership benefits the entire region, Safranski said.

“This was a great mutual commitment. The college has helped students learn we have had the college help CHS staff learn as well as our farmer owners through the help of accurate Innovation plots and seed trial plots,” Safranski said.



Trading commodities at NDSU lab

North Dakota State University's Commodity Trading Lab provides real-world experience for students with interests in commodity marketing.

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It is the first of its kind that specializes in agricultural commodities and continues NDSU's tradition of educating future leaders in this industry.

The trading facility features the latest and best in technology, where students and researchers can analyze commodity markets and learn the fast-paced activity of risk management and trading.

"It will ultimately provide better training and exposure to marketing technology that is now the standard in these industries," said William Wilson, University Distinguished Professor. "It has a multitude of uses and has the potential to be

used in other programs, including portfolio and finance courses in the College of Business."

It is located on the first floor of Richard H. Barry Hall in downtown Fargo, with 32 workstations and can be expanded to 48 seats. Using dynamic linkages, students can produce spreadsheet analysis using many sources of information.

Anything on a monitored screen can be linked to another screen, and the instant a number or order changes anywhere, it automatically updates the spreadsheet statistics, a system in tune with the immediate and constantly changing realm of international commodity trading. Funding for the facility came from many sources.

The North Dakota Agricultural Experiment Station, NDSU Office of the Provost and NDSU Technology Fee Advisory Committee

supplied seed money. Major agribusiness companies provided various forms of financial support, including ADM, CHS, Gavelon, The Rice Trader and George M. Schuler III of Minn-Kota Ag Products Inc.

State commodity organizations also provided funds, including the North Dakota Corn Council, North Dakota Soybean Council, North Dakota Wheat Commission and Northern Crops Institute.

"It's a true partnership between the university and industry to do a better job of teaching," Wilson said.



Ag-Based Student Organizations:

Throughout the university system's ag colleges and universities, there are numerous student organizations to join, especially those based in agriculture. Joining these clubs can help students learn teamwork, leadership and to build a network of friends. Student groups are a great way to meet people with similar interests and to have a good time, and to meet upperclassmen who can provide good information about courses, instructors and campus life. There's no limit to what students can learn when they're studying agriculture by day and talking about it with friends during off time. It can also greatly help in opening doors after graduation. Below are some of the Agriculture organizations at NDSU.

Ag Ambassadors
Agribusiness Club
Agricultural Communicators of Tomorrow
Agricultural Systems Management Club
Agronomy Club
American Society of Ag and Biological Engineers
Animal Sciences Graduate Student Association
Biotechnology and Microbiology Club
Bison Dairy Club
Bison Pullers
Collegiate Cattlewomen
Collegiate Farm Bureau
Entomology Club
Farmers Union Collegiate Chapter
Food Science/Food Safety Club
Honor Commission

Horsemen's Association
Horticulture and Forestry Club
Judging Club
National Agri-Marketing Association (NAMA)
Natural Resources Management Club
NDSU Ag Collective
Plant Pathology Student Organization
Plant Sciences Graduate Student Association
Post-Secondary Agricultural Students/ Collegiate FFA
Pre-Veterinary Club
Rodeo Club
Saddle and Sirloin Club
Turf Club
Veterinary Technology Club

For more information about any of the 11 campuses that make up the North Dakota University System, contact the college or university at:

Bismarck State College
Bismarck, ND 58506
701.224.5429
800.445.5073
www.bismarckstate.edu

Dakota College at Bottineau
Bottineau, ND 58318
701.228.5488
800.542.6866
www.dakotacollege.edu

Dickinson State University
Dickinson, ND 58601
701.483.2175
800.279.4295
www.dickinsonstate.edu

Lake Region State College
Devils Lake, ND 58301
701.662.1514
800.443.1313
www.lrsc.edu

Mayville State University
Mayville, ND 58257
701.788.4842
800.437.4104 ext. 34842
www.mayvillestate.edu

Minot State University
Minot, ND 58707
701.858.3350
800.777.0750
www.minotstateu.edu

North Dakota State College of Science
Wahpeton, ND 58076
701.671.2521
800.342.4325
www.ndscs.edu

North Dakota State University
Fargo, ND 58108-6050
701.231.8643
800.488.6378
www.ndsu.edu

University of North Dakota
Grand Forks, ND 58202
701.777.3000
800.CALL UND (225.5863)
www.und.edu

Valley City State University
Valley City, ND 58072
701.845.7101
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