MESSAGE FROM THE CHAIR
KENNETH HELLEVANG

Greetings from the NDSU Department of Agricultural and Bio-
systems Engineering.

The search for a new chair of the department last year was a
failed search. At the request of the Vice
President of Agricultural Affairs, I agreed
to continue to serve as interim chair. The
search has been put on hold until at least
after the legislative session this spring.

There have been or will soon be numer-
ous personnel changes. After a national
search with about 38 applicants and after ex-
tensive deliberation, Dr. Ewumbua Monono
was hired for the bioprocess engineering faculty position. We have
hired Dr. Niloy Chandra Sarker as the research specialist in biopro-
cessing. Jim Moos, our shop technician, retired on Jan. 4 after 45
years in the department. John Nowatzki, extension machinery spe-
cialist, is retiring in early March. Brian Gregor, recently retired from
Doosan Bobcat, is assisting with teaching our senior design course.

Elton Solseng, a retired faculty member, taught our ASM electricity
and electronics course this past fall with assistance from Dr. Ademo-
la (Demmy) Hammed, ABEN research assistant professor.

The precision ag major is progressing very well. The first student
is graduating this spring. The major has about 30 students and the
introductory course had about 70 students last fall. We developed
a poster promoting the precision ag minor that was placed in the
various buildings where agricultural programs are taught. There is
considerable interest by students with other majors. We have de-
veloped a relationship with Titan Machinery and Case IH and other
companies to provide support for the program.

Research in precision agriculture also continues to grow with
several graduate students and cooperators. There has also been the
addition of three post-doctoral fellows to the research group.

Planning has begun for us to vacate our building and move into
Ladd Hall. The new science building on campus is scheduled to be
continued on next page
completed in 2021. Ladd Hall will be renovated in 2022, with ABEN moving in 2023. The tentative plan now is for the machinery and biosystems faculty to be in the pilot plant (bioprocessing lab and machinery learning center), the rest of us in Ladd, and the shop (fabrication space) to be in the Technology Park. The ABEN building is to be demolished.

The coronavirus has caused major disruptions for us, similar to other campuses. Just before spring break 2020, it was decided that students would not be returning to campus and that all classes would be offered online. It was a huge effort to convert not only lectures, but laboratories to online. During the summer, we installed technology that permits simultaneous in-class and online HyFlex instruction (cameras, microphones, Zoom connection, etc.). The lectures are also recorded for the students to access at another time.

We started the fall semester with most students in the classroom and finished with most participating remotely. We have encouraged students to participate in labs in-person and most of them do, but they can join online to participate remotely. It requires us all to communicate in different ways for Q&A sessions, advisor visits, and the interaction between students working on team projects. It is not as good as in-class instruction, but both faculty and students are making it work. Most faculty and staff are working remotely, due to concern about exposure, but some find that it works better to be in the office. The virus infection rate on campus has been less than in the community.

Our research productivity has continued during the pandemic. We have about $4 million of grant-supported research being done by faculty and about 25 graduate students. We adopted the recommended COVID-19 protocol, including one person per vehicle, adequate spacing and everyone wearing masks.

Budgets are being reduced. We just had a 4% cut for 2020-2021 and the governor’s budget is calling for a 15% cut in extension and research, and about a 7% cut in the NDSU budget. After experiencing major cuts in the past few years, any reductions will not only continue to reduce the number of faculty and staff, but will eliminate programs.

In this issue of our newsletter, please read about the many student activities including senior projects, the Ag Tech Expo, and student club activities. The many scholarships received by the students are listed in the newsletter. Thank you to the many donors whose generosity makes this possible.
Justin Lehmann first precision ag graduate

Justin Lehmann has been a bit of a beta test throughout college, pioneering his way through the first precision agriculture program at two different campuses. But as the first graduate with a Bachelor of Science degree in precision agriculture from North Dakota State University (NDSU) this spring, he’s already sorting through job offers.

Added as an academic degree in January 2018, the precision agriculture major in the College of Agriculture, Food Systems and Natural Resources is administered by the Department of Agricultural and Biosystems Engineering. The curriculum balances instruction in agricultural sciences principles with hands-on training and application of technology.

From a family farm near Havana, Lehmann first attended North Dakota State College of Science (NDSCS) in Wahpeton for two years, obtaining an associate degree in both precision agriculture and agronomy. He was the first to enroll and graduate from the newly launched NDSCS precision ag program as well.

“I've kind of been a guinea pig through my whole college career,” he says with a laugh.

In the fall of 2019, Lehmann enrolled in the NDSU precision agriculture program.

“I decided I wanted to continue my education at NDSU and hopefully gain some more valuable knowledge in agriculture and specifically precision ag,” he says.

This spring, he will be the first NDSU graduate with a precision ag major, along with a minor in crop and weed science.

“Growing up on a family farm, I loved agriculture as a whole and I really saw a lot of technology on the farm and off the farm. I love technology, so I wanted to go that route and experience all the possibilities there are in precision ag,” he says. “The possibilities are infinite.”

With smaller class sizes, Lehmann likes being able to discuss all the possibilities of precision ag with his peers and professors.

“Just having that discussion with our teachers on the possibilities of precision ag is really fun,” he says. “Since precision ag is so new, you can discuss future possibilities and you could even possibly develop your own technology if you really wanted to.”

With a strong background in agriculture and technology, Lehmann hopes to offer his knowledge and skills in the precision ag world to maximize profitability for the growers he supports.

He has a strong interest in all aspects of the technology.

“I really love it all,” he says. “The one technology that I really enjoy is planter technology. All the sensors and all the equipment on planters is amazing.”

With job offers already in hand, Lehmann feels his education will land him a solid career.

“The job market is tremendous for people who know and understand the technology in agriculture,” he says. “I would definitely consider NDSU as a very good option. There are very, very good teachers here who are willing to help students and people who are looking at precision ag specifically. It’s a great program.”

A focused in-depth education in sciences, technologies and practices, including unmanned aerial systems (drones), remote sensing, a critical intelligence, machine learning, sensors, robotic applications, cloud computing, big data management, and site-specific resources management, awaits students in the precision agriculture field.

“There are lots of farmers who believe in the technology and want to adopt the technology, but they just don’t have the knowledge to fully adopt it or run it by themselves, so they rely on people like me or future students to be able to help them through all the software and equipment to interpret and ultimately maximize their profitability,” Lehmann says.

And Lehmann doesn’t mind being the beta test through NDSU’s adaption of a precision ag degree. He’ll take the bragging rights of being the first graduate of the program.

“I definitely feel honored,” he says.
HyFlex is powerful tool in continuing classes

As North Dakota State University (NDSU) began adjusting to teaching students through a pandemic, both instructors and students were on a learning curve.

“It certainly has been an interesting challenge,” says Matthew Olhoft, a senior lecturer in the Department of Agricultural and Bio-systems Engineering.

In the fall of 2020, NDSU began using a technology-enhanced instructional model that allows students and faculty to fully interact in person or remotely. The HyFlex Educational Model, announced by President Dean Bresciani, is a powerful tool during the pandemic, as it allows for live participation in both modes, and students will be able to choose how to participate.

“The HyFlex world is one where students and faculty that are vulnerable, in isolation or in quarantine can still effectively teach, learn and be an active part of the NDSU community,” Bresciani says. “We heard the concerns of some faculty and students about the classroom environment, and this model helps to allay those concerns.”

Nearly every classroom on the NDSU campus is equipped, and faculty were supported over the summer to train and prepare to teach in this innovative model.

Students and faculty are required to wear masks in classes, and the university implemented numerous other changes to classroom sizes, furniture arrangements, disinfecting practices and more.

“It’s not my preferred way to teach. I’m more into working with students and building relationships and it is quite difficult to do that over a computer screen. It’s quite an adjustment for me. Also, when students are in person, everyone is wearing masks, so it’s been kind of difficult to get to know the new freshman. Unfortunately, I don’t really know what my new freshmen look like,” Olhoft says with a laugh.

“I miss the smiles. Everybody has to wear a mask, so I miss seeing people’s smiles and sometimes I misidentify people, because you only see above the nose and below the baseball cap,” adds Dr. Dean Steele, an associate professor.

But professors are adapting to changes under the COVID-19 pandemic, as well as students.

Olhoft is adjusting labs, for example, to accommodate students who must miss sessions due to quarantines.

“The biggest challenge is students who have had to quarantine at various times, so the amount of lab time that we’re spending has been reduced to allow those students to come and go as necessary for quarantine,” he says.

Where 10 physical labs were scheduled before, now seven labs are scheduled, with a flexible schedule for students to come back and complete a lab they didn’t get earlier. The number of students in lab has been reduced for social distancing as well.

Overall, HyFlex teaching has been going well, Olhoft says. “I have very few students that attend in person,” he says. “They are there. They are all on the computer. As far as numbers of students in the class, they’ve all been attending pretty well. I haven’t seen any attendance drop.”

Steele is another instructor adapting to the changes in instructional delivery.

“The classroom is the studio. We’re presenting or speaking or interacting with students in the classroom who are in person, but simultaneously broadcasting through Zoom or some other platform,” he says.

“There are some bumps in the road,” he says. For example, he sees some hesitancy among students to speak over a remote connection. And sometimes instructors overlook a detail.

“So, I’m six minutes into a lecture or presentation and somebody pipes up from the remote audience saying, ‘I think you forgot to share your screen,’” he says. Or he doesn’t see a message in a chatbox right away, and “I’m 400 yards down the road already.”

Steele already had experience in teaching in computer clusters and recording sessions in a video capture system for later replay before the pandemic began, using the Blackboard system.

So, he quickly became a resource for others on how to hook up microphones or capture a screen on video.

“It was a huge switchover, because most of us were not doing any distance kind of engagement with our students. In our department, we were not really in that mode,” he says.

The HyFlex system is synchronous, where remote students must participate during regular class hours. The sessions are recorded for viewing later, but the student loses the live interaction.

“They can watch videos after the fact on their own time, but then they’re not going to get class participation. In other words, I’m not going to answer their text messages at 10 o’clock at night,” he says.

As the first remote system was put into place last spring, Steele remembers holding test runs with other department faculty members
alternating between student and instructor roles.
“We experimented on ourselves first,” he says.
“Some of the technology in our classrooms has had to get updated very quickly. It’s forced us as instructors to really move forward with electronic media more so,” Olhoft says.
Steele hopes instructors continue to allow some flexibility with students.
“If we have to operate in this environment, it’s really important to have a lot of grace for the students and myself. It has to be a two-way give and take,” he says. But students are tech savvy, he says, and may have had less of a learning curve than their professors.
“They’re pretty tech savvy and pretty sharp,” Steele says.
“They’ve been accepting of it and patient when we work through things that are a challenge for us. I commend them for sticking with us and bearing with us through all this. I think we’ll come out the other side better,” Olhoft says.
But both miss some of the former sights and sounds on campus.
“If you go outside during the regular class break, when you’re expecting to see all these students moving between buildings on campus, it is so desolate here. It’s so sparse,” Steele says.
### Student clubs and offices

#### Agricultural Systems Management • 2020-2021

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<td>Secretary</td>
<td>Harlee Gunning</td>
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<td>Treasurer</td>
<td>Phillip Steffan</td>
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<td>CSO representative</td>
<td>Jordan Jorde</td>
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<td>Advisor</td>
<td>Matt Olhoft</td>
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**ABEN Student Engineering Branch of ASABE** (coordinates joint activities and club presidents)

#### Bison Pullers/Quarter Scale Tractor • 2020-2021

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<td>Tyler Goplen</td>
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<td>Matt Olhoft</td>
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#### Alpha Epsilon • 2020-2021

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<td>Vice president</td>
<td>Ranjan Sapkota</td>
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<td>Justin Lester</td>
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<td>Treasurer</td>
<td>Danika Tweten</td>
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<td>Peer Mentor Program Coord.</td>
<td>Scott Folz</td>
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<td>Advisor</td>
<td>Xinhua Jia</td>
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#### Precision Ag

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<td>Rex Sun</td>
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Q & A with student interns

In an internship or co-op education program, students gain valuable work experiences that complement each semester at NDSU. Internship programs provide financial benefits while in college, increased employment opportunities, and higher starting salaries. Internships are often scheduled during the sophomore, junior and senior year.

Students should contact Julie Bietz, student coordinator, at julie.bietz@ndsu.edu; the Cooperative Education Office (Ceres 306); or their student advisor if they are interested in an internship program. More information is also available at: www.ndsu.edu/aben/internships.

We reached out to North Dakota State University ABEN Department students who have participated in an internship. Here, they share their experiences.

**Gabe Beaver**

**Q.** What degree are you pursuing?
   **Bachelor of Science degree in Agricultural and Biosystems Engineering**

**Q.** What year are you at NDSU?
   **Junior**

**Q.** Where is your hometown?
   **Rolette**

**Q.** When and where was your internship?
   **My internship was from June through August 2020 with Superior Industries in Morris, Minn.**

**Q.** How did you discover this internship was available?
   **I found the internship through NDSU’s CareerLink website.**

**Q.** What were your job duties?
   **At Superior, I worked on drafting drawings for parts and assemblies of designed machines. I also did some design to optimize an assembly process and worked on standardization of common parts and assemblies.**

**Q.** What did you learn from this internship that you did not necessarily expect to learn?
   **I learned that sometimes there is not a perfect solution to the problem you are working on. Given constraints of practicality, time, money and materials, sometimes good enough is as good as it can be.**

**Q.** How beneficial was this internship to assisting you in developing your career skills?
   **This internship was very helpful with increasing my confidence in the interview process. I also learned how to operate in a professional work environment in an efficient way as well as communicate with co-workers and managers effectively.**

**Q.** What was the most challenging aspect of the internship?
   **The most challenging part was communication, especially when trying to solve tough problems with other engineers across the country.**

**Q.** What was the most fun aspect?
   **I really enjoyed being a part of and experiencing the whole process, from the conveyors being designed and drafted, to the parts being fabricated, welded and assembled, all in one building.**

**Q.** What would you say to others considering internships?
   **I would say even though you might be a bit nervous to jump in like I was, it is very much worth it, and it will boost your confidence and understanding greatly for the future.**

upiter 2021 • 7

NDSU AGRICULTURAL AND BIOSYSTEMS ENGINEERING
**William Huber**

**Q.** What degree are you pursuing?
  Bachelor of Science degree in Agricultural and Biosystems Engineering

**Q.** What year are you at NDSU?
  Junior

**Q.** Where is your hometown?
  Reiles Acres

**Q.** When and where was your internship?
  Amity Technology in Fargo starting in May 2020.

**Q.** How did you discover this internship was available?
  Amity was listed on the spring career fair page. When the career fair was canceled due to snow, I called the company to see if they had any internship openings. I then did an over-the-phone interview with my current boss and was asked to come in for an in-person interview.

**Q.** What were your job duties?
  - Leading and assisting in design projects, documentation and analysis of our sugar beet harvesting and silage equipment lines
  - Leading and assisting in quality control, field testing and assembly of the equipment lines.

**Q.** What did you learn from this internship that you did not necessarily expect to learn?
  How to operate the sugar beet harvesting equipment.

**Q.** How beneficial was this internship to assisting you in developing your career skills?
  This internship was extremely beneficial in that it opened a potential career path with this company or another in the agricultural equipment manufacturing field. I have made great connections with the people I work with and have learned a great deal. I have become very familiar with the SolidWorks software, learned how to operate sugar beet harvesting equipment, learned the ins and outs of how farm equipment is manufactured, and developed some great tools to assist how I go about my design process.

**Q.** What was the most fun aspect?
  Getting to perform hands-on work.

**Q.** What was the most challenging aspect of the internship?
  Making sure every engineering change was well-documented and communicated with the production team.

**Q.** What would you say to others considering internships?
  Seek out an internship as early as possible. They are extremely beneficial in making connections in your field of interest and gaining valuable experience.

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**Landon Overbo**

**Q.** What degree are you pursuing?
  Precision Ag

**Q.** What year are you at NDSU?
  Junior

**Q.** Where is your hometown?
  Moorhead, Minn.

**Q.** When and where was your internship?
  The last two summers (three-month time-frames) with Pioneer Seed/ Buchanan Ag located in Buchanan.

**Q.** How did you discover this internship was available?
  Through family and going to the NDSU career fair at the Fargodome.

**Q.** What were your job duties?
  Seed treating and delivery, crop scouting, warehouse inventory/management, soil sampling, customer visits and sales.

**Q.** What did you learn from this internship that you did not necessarily expect to learn?
  I learned how a co-op is operated/managed. I learned a lot of weed identification and benefits to proper soil fertility. I got to see dozens of farm operations and the many different ways they can be managed.

**Q.** How beneficial was this internship to assisting you in developing your career skills?
  It was extremely beneficial for me in
developing communication and customer relations skills. I wouldn’t change my experience for the world; it was very helpful and eye-opening.

**Q.** What was the most challenging aspect of the internship?

Not having more equipment experience going into it (forklift, manual vehicle, skid steer, truck driving).

**Q.** What was the most fun aspect?

Being able to interact with so many successful people in the agricultural industry and learning so much from that and being at different farming operations.

**Q.** Anything else you would like to add?

There are so many opportunities. Don’t be discouraged if one doesn’t work out. Being able to communicate with adults is also an important skill to continually improve.

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**2020 Agricultural Technology Exposition results**

Our students participated in the Agricultural Technology Expo in February 2020. The Expo gives our students an opportunity to showcase their knowledge by presenting projects dealing with technology and agriculture.

This year’s event is Saturday, Feb. 13. Be sure to check our webpage for viewing information: https://www.ndsu.edu/aben/student_clubs/agricultural_technology_expo/.

**Machinery Division Champion:** Tyler Goplen  
*Project:* “Bale Wrappers: A Simple Design with a Big Impact”

**Precision Ag Champion:** Eric Meredith  
*Project:* “Weed Species Identification Using Artificial Intelligence”

**Soil Water and Environment Champion:** Aaron Dean  
*Project:* “From Dirt to Soil”

**Structures, Energy and Processing Champion:** Max Salzer  
*Project:* “Enhanced Biofuel Production Using Hydrodynamic Cavitation”

**Power Division Champion:** Caleb Becker, John Haverland, Landon Overbo  
*Project:* “DOT: Autonomous Technology”

**Champion Freshman Project:** Tyler Goplen  
*Project:* “Bale Wrappers: A Simple Design with a Big Impact”

**Senior Design Champion:** Mitchell Blaha, Lane Jeffers, Carter Peterson, Sawyer Burchill  
*Project:* “Hydraulic Remote-Valve Dynamometer”

**Graduate Research Champion:** Nadia Delavapour  
*Project:* “Auto-Steering of Tractor-Towed Equipment for Post Planting Operations”

**People’s Choice:** Seth Kjelberg, Danika Tweten, Cody Henne  
*Project:* “Lely Astronaut”

**Reserve Champion:** Aaron Dean  
*Project:* “From Dirt to Soil”

**Grand Champion:** Tyler Goplen  
*Project:* “Bale Wrappers: A Simple Design with a Big Impact”

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**Q.** What would you say to others considering internships?

I would highly recommend doing AT LEAST one summer internship, if not several. It is so beneficial in helping discover a career path and actually getting experience in the field you are going to school for. You learn so much through an internship that can’t be taught in a classroom. Also, be yourself, but also go outside your comfort zone. Talk to people, have conversations and ask questions. You will get so much more out of the experience that way.
### Scholarship winners

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<td>Breeya Pederson</td>
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<td>Md. Sanaul Huda</td>
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**In memorium - 2020**

**Lester Amundson**, 85, BS ’56, agricultural mechanization, was a farmer, specializing in certified seed potatoes until 2002. He served on numerous boards, including West Polk County Farm Board, Red River Valley Potato Growers Association and Red River Valley Winter Show. He also was a licensed ham radio operator. He was a U.S. Army veteran who lived in rural East Grand Forks, Minn.

**Donald Elliott**, 65, BS ’77, agricultural mechanization, farmed near Galesberg. He lived in Mayville.

**Dennis Lindemann**, 85, BS ’58, agricultural engineering, held engineering and management positions with the John Deere Co., Melroe Bobcat and Wil-Rich Inc. He was a director on several volunteer boards, including Missouri Slope Lutheran Home in Bismarck; economic development boards in Gwinner and Wahpeton; and the NDSU Alumni Association. He was a life trustee for the NDSU Foundation and lived in Fargo.

**Douglas Murray**, 76, BS ’67, agricultural mechanization, lived and worked on the family farm near Wimbledon. He was a U.S. Army veteran who served in Vietnam and received the Bronze Star.

**Paul Swedlund**, 85, BS ’57, agricultural engineering, lived in Bismarck.

**Orlan Swenson**, 78, BS ’64, agricultural mechanization, farmed near Kindred. He was a member of the Jaycees, Kindred Lions Club and the Kindred Elevator board. He lived in Kindred.

**Gary Burau**, 76, BS ’64, agricultural mechanization, held numerous positions for the John Deere Company during a 38-year career. He retired in 2002 as the Dallas branch manager. He lived in Frisco, Texas.

**Roger Diehl**, 82, BS ’59, agricultural mechanization, was a third-generation farmer on the family farm and taught for many years at the Crookston Agricultural School. He served on the Nodak Electric Cooperative board of directors for more than 40 years. He lived in Hillsboro.

**Virgil Froemke**, 95, BS ’50, agricultural engineering, had a long career with J.I. Case Co., with stops in North Dakota, Colorado, Utah, California and Minnesota. He was an active Shriner and was Potentate of El Zagal Shrine. He was a U.S. Navy veteran who lived in Moorhead, Minn.

**John Kaspari**, 92, BS ’50, agricultural engineering, taught physics and aeronautics for 22 years at Hibbing, Minn., High School, where he oversaw the renovation of the physics lab and developed the aeronautics program. He later made several trips to St. Vincent Island in the West Indies to build homes for families in need. He was a U.S. Navy World War II veteran who lived in Balsam Township, Minnesota.

**Cyril “Bud” Mondry**, 89, BS ’51, agricultural mechanization, was the owner and operator of Our Own Hardware in Oslo, Minn., for 48 years. He also was city clerk and was elected Oslo’s mayor in 1986. He was a U.S. Army veteran of the Korean War, and lived in Oslo.

**David Nichols**, 71, BS ’71, agricultural mechanization, MS ’86, agricultural education, taught at the University of Minnesota Crookston and later was the agricultural/industrial arts and FFA adviser at Climax, Minn., High School. He served one term as mayor of Climax. He was a U.S. Army veteran who lived in Climax.

**Larry Orke**, 68, BS ’72, agricultural mechanization, lived in Fargo. He was a former resident of Bottineau.

**David Porter**, 68, BS ’74, agricultural mechanization, worked in Sydney, Mont.; Torrington, Wyo.; and Wahpeton, as a field rep for Holly Sugar and Minn-Dakota Cooperative. He also earned his private pilot’s license and later returned to operate the family farm near Grandin. He lived in Fargo.

**Merle Presler**, 60, BS ’82, agricultural mechanization, farmed in the Gackle area until 1986. He later was employed by Garden State Bean Co. and Oakes Tire Center, Oakes, and then started his own business—Presler Farm Service. He lived in Oakes.

**Jeffery Sieg**, 61, BS ’80, agricultural mechanization, was an science instructor at Emerado Middle School and Mayville State University. He lived in Emerado.

**Alfred Steinke**, 95, BS ’49, agricultural engineering, was an irrigation engineer at the Bureau of Reclamation for 30 years. After retiring, he traveled throughout North Dakota working for Old West Regional Commission and FEMA. He lived in Bismarck.

**Ronald Ulven**, 80, BS ’59, agricultural and biosystems engineering, was vice president of the State Bank of Hawley. He worked for the bank for 30 years, retiring in 1999. He was active with the Chamber of Commerce, city council, rodeo committee, Clay County Fair, Hawley Jaycees, Lions and American Legion. He was King Agassiz of the Crookston Winter shows in 1972. He lived in Hawley, Minn.
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