

Fall 2017

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A HEALTHY FUTURE

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Vision

FOOD • FUEL • WATER • LANDSCAPES • PEOPLE

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES | UNIVERSITY OF NEBRASKA-LINCOLN



GROWING NEBRASKA



Michael J. Boehm

Cool, crisp mornings. Husker games. Hundreds of new faces, eager to learn. There is truly nothing quite like our college campus in the fall.

This fall has been an especially exciting one as the Massengale Residential Center on East Campus welcomed its first students.

Between the variety of living spaces, the interactive learning and engagement zones, and the beautiful views of the Maxwell Arboretum, our students are in for a special experience. I enjoyed the opportunity to help move a few of our students into their new home on campus, and marveled at how mutually excited the students, parents, and our university staff are for the future.

That shared excitement stems from a real need for these students in our agriculture and natural resources industries. The opportunities in sustainable food production, water use efficiency and global marketing are endless. We need the best thinkers, inventors and doers to make our state a global leader in those areas.

To address those opportunities, we have prioritized the areas of healthy humans, science literacy, stress biology, healthy systems for agricultural production and natural resources, computational sciences, and drivers of economic vitality for Nebraska.

We are striving to excel in these areas, but with your involvement, we can go further and have a greater impact. As we continue to strategize in these areas, we encourage you to become a part of the conversation.

We welcome your feedback, ideas, engagement and support in our ongoing endeavor to make your university a global leader in these key areas. Learn more by going to go.unl.edu/GrowingNebraska.

Thank you for sharing in our passion for education and advancing the state of Nebraska. Whether it be through the recruitment of your children or neighbors to the university, your partnership in advancing our discovery agenda, your participation in an extension or 4-H program, or through your generous giving of your time, talent or treasure; we thank you!

Stop by campus in Lincoln soon, or visit one of our many research and extension sites across Nebraska, and experience all your university has to offer. Of particular interest, might be the recently opened Veterinary Diagnostic Center on campus. The state-of-the-art facility is already buzzing with students and researchers, and the excitement about the potential of the new space is tangible.

If you do stop in Lincoln, you'll probably find me out roasting marshmallows with our

students by the new fire pit at the Massengale Residential Center, or enjoying an ice cream cone at our Dairy Store, which is celebrating 100 years this year. Every day is a good day, in the good life!

Michael J. Boehm, Ph.D.
Vice President, Agriculture and Natural Resources
University of Nebraska
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University of Nebraska-Lincoln



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GROWING
A HEALTHY FUTURE

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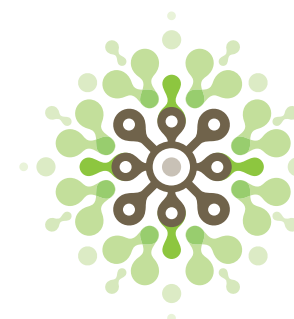
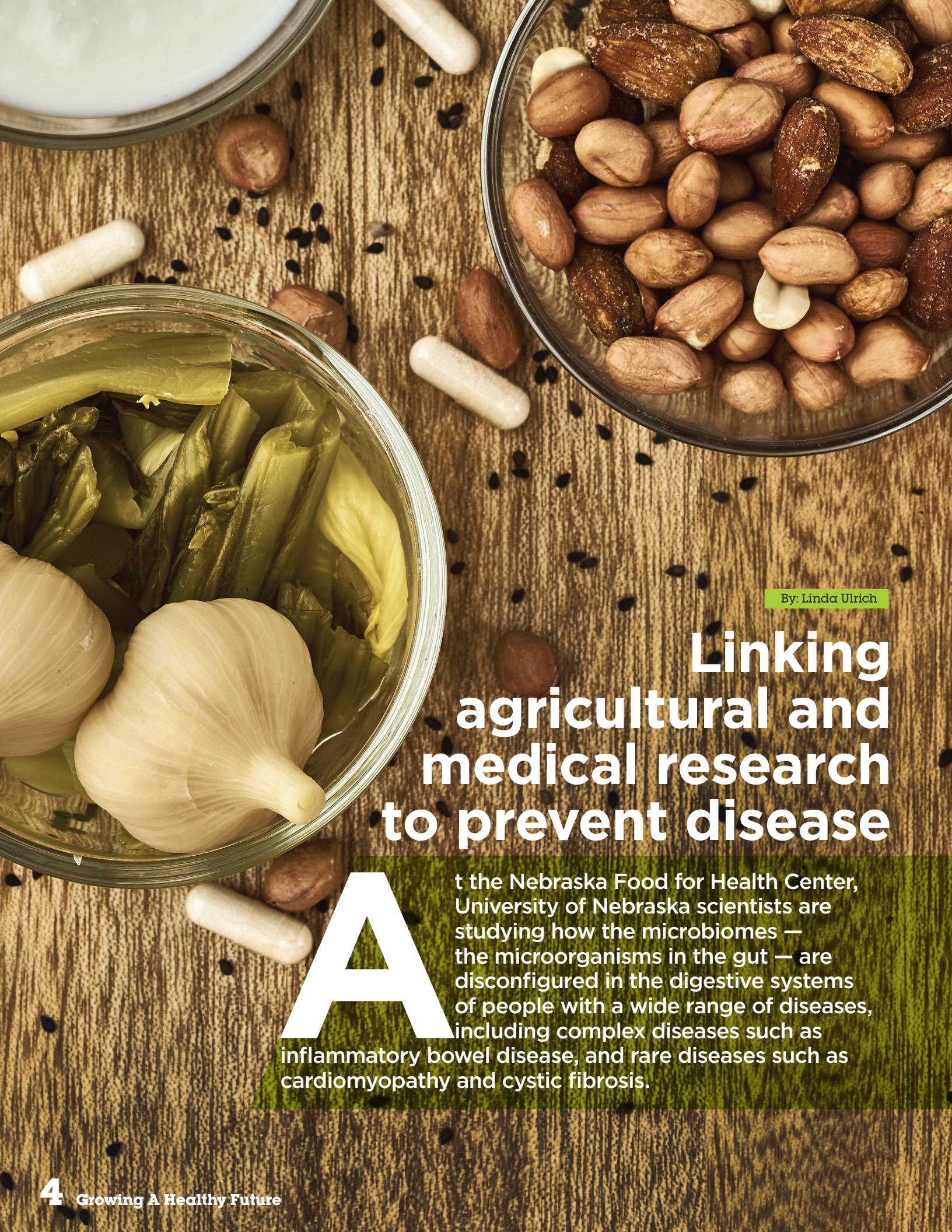
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Aerial view of the hops yard on East Campus.

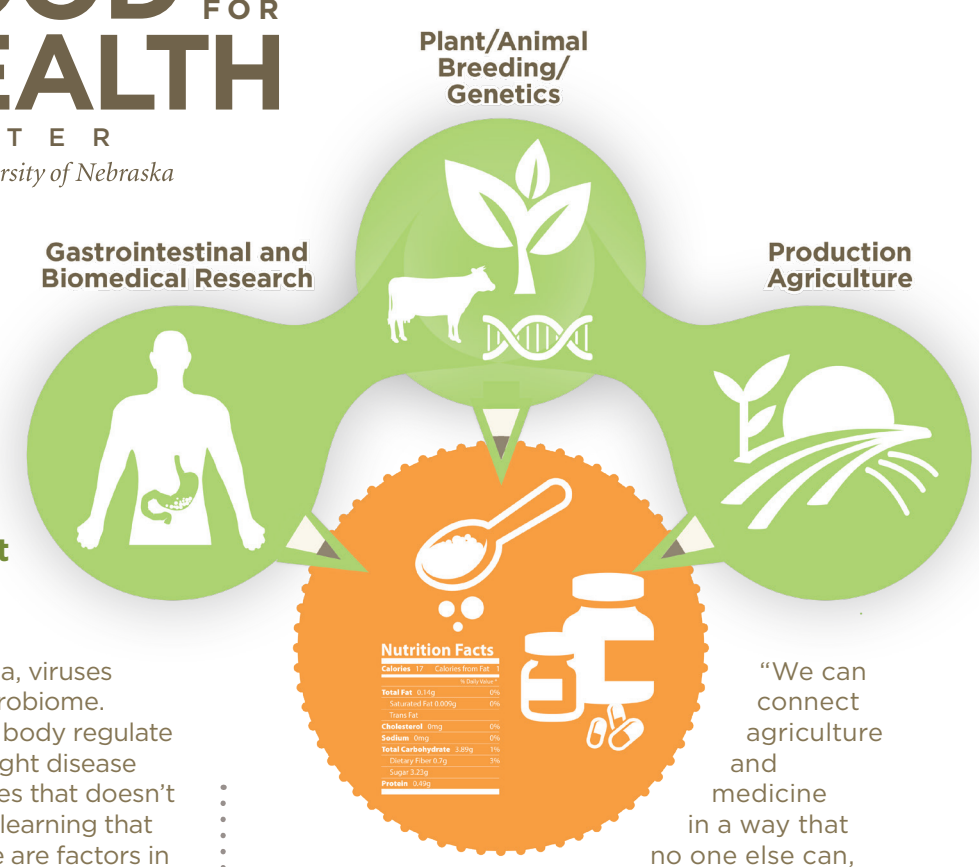
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NEBRASKA
FOOD FOR HEALTH
 CENTER
 at the University of Nebraska

“What we discover may someday lead to unprecedented approaches to prevent complex diseases and improve the quality of life of individuals with rare diseases,” said Andrew Benson, center director. “This is a good test case for us.”



Trillions of microbes, such as bacteria, viruses and fungi, live in the human gut microbiome. Normally, the microbiome helps the body regulate organs, develop immune systems, fight disease and metabolize foods. But sometimes that doesn't happen, and center researchers are learning that abnormalities in the gut microbiome are factors in many diseases.

The multidisciplinary center capitalizes on strengths in agricultural production, food processing and biomedical research from throughout the university system to develop the science of dietary modulation — the ability to manipulate the gut microbiome with specific dietary components. The research focuses on developing hybrid crops and foods with proven capacity to influence the microbiome and provide health benefits for people with cystic fibrosis, heart disease, inflammatory bowel disease, diabetes, obesity, cancers and mental disorders. Identifying components from commodity plants that selectively feed beneficial microbes or inhibit growth of the harmful ones will enable researchers to develop ingredients and foods from such plants with health-promoting properties, Benson said.

Many major universities with medical centers are investigating the gut microbiome, but the Nebraska Food for Health Center is unique in its approach.

“We can connect agriculture and medicine in a way that no one else can, and we use the gut microbiome to connect them,” Benson said. “Everything we do is driven by science.”

For example, the university's rich history in plant breeding enables scientists to use quantitative genetics and breeding to identify potentially beneficial “traits” in crops such as corn, soybeans, dry edible beans and sorghum. These traits are identified first by testing the capacity of the grains to affect a microbiome in vitro.

“We can connect agriculture and medicine in a way that no one else can, and we use the gut microbiome to connect them.”
 - Andy Benson

When candidate traits are identified, researchers next validate the effects by observing how the grains interact with the gut microorganisms in a live animal in the Gnotobiotic Mouse Facility. If those molecules show promise, scientists will then progress to testing the effects in human clinical studies and work to develop hybrid crops containing those beneficial ingredients to improve human health.

“This new interface between agriculture and medicine holds tremendous potential to transform how we think about preventing and treating disease,” Benson said.

For more information, visit foodforhealth.unl.edu.

By: Linda Ulrich

Linking agricultural and medical research to prevent disease

At the Nebraska Food for Health Center, University of Nebraska scientists are studying how the microbiomes — the microorganisms in the gut — are disconfigured in the digestive systems of people with a wide range of diseases, including complex diseases such as inflammatory bowel disease, and rare diseases such as cardiomyopathy and cystic fibrosis.

Nebraska Food for Health Center Researchers

The Nebraska Food for Health Center includes faculty from the University of Nebraska-Lincoln, the University of Nebraska Medical Center and the University of Nebraska at Omaha.


“The level of collaborative spirit is tremendous,” said Andrew Benson, center director.

The researchers and their areas of expertise:

University of Nebraska-Lincoln




Andy Benson
center director; University of Nebraska Food for Health Presidential Chair; professor, Department of Food Science and Technology




Edgar Cahoon
George W. Holmes Professor of Biochemistry, Department of Biochemistry; director, Plant Science Innovation




Jennifer Clarke
associate professor, Departments of Food Science and Technology and Statistics; director, Quantitative Life Sciences Initiative




Tom Clemente
Eugene W. Price Distinguished Professor of Biotechnology, Center for Plant Science Innovation; professor, Department of Agronomy and Horticulture




Samodha Fernando
assistant professor, Nutritional Biochemistry, Department of Animal Science; Nebraska Gateway to Nutrigenomics




Robert Hutkins
Khem Shahani Distinguished Professor of Food Science, Department of Food Science and Technology




David Hyten
Haskins Professor in Plant Genetics; associate professor, Department of Agronomy and Horticulture, soybean genetics and genomics



Jacques Izard
associate professor, Department of Food Science and Technology



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professor, Department of Statistics; coordinator, Biomedical and Obesity Research Core; investigator, Nebraska Gateway to Nutrigenomics



Etsuko Moriyama
professor, School of Biological Sciences and Department of Computer Science and Engineering




Kurt Pipenbrink
assistant professor, Department of Food Science and Technology



Amanda Ramer-Tait
Harold and Esther Edgerton assistant professor, Department of Food Science and Technology; project leader, Nebraska Center for the Prevention of Obesity Diseases




Devin Rose
associate professor, Departments of Agronomy and Horticulture, and Food Science and Technology



James Schnable
assistant professor, Department of Agronomy and Horticulture; Center for Plant Science and Innovation; Quantitative Life Sciences Initiative




Rohita Sinhea
research assistant professor, Department of Food Science and Technology; pilot project leader, Nebraska Center for the Prevention of Obesity Diseases



Harkamal Walia
associate professor, Department of Agronomy and Horticulture; Robert B. Daugherty Water for Food Institute fellow


University of Nebraska Medical Center




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associate professor, Department of Pharmacology and Experimental Neuroscience



Corrine Hanson
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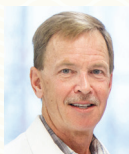


Tricia LeVan
associate professor, Department of Epidemiology; director, Facility for Mutation of Methylation Analysis



Robert Norgren
professor, Department of Genetics, Cell Biology and Anatomy

University of Nebraska at Omaha



Jeffrey A. French
Varner Professor of Neuroscience and Psychology; director, Callitrichid Research Center



Andrew Benson (right) and James Schnable examine a head of grain sorghum in the Nebraska Innovation Campus Greenhouse.

Thinking bigger to improve human health



Jeffrey Raikes

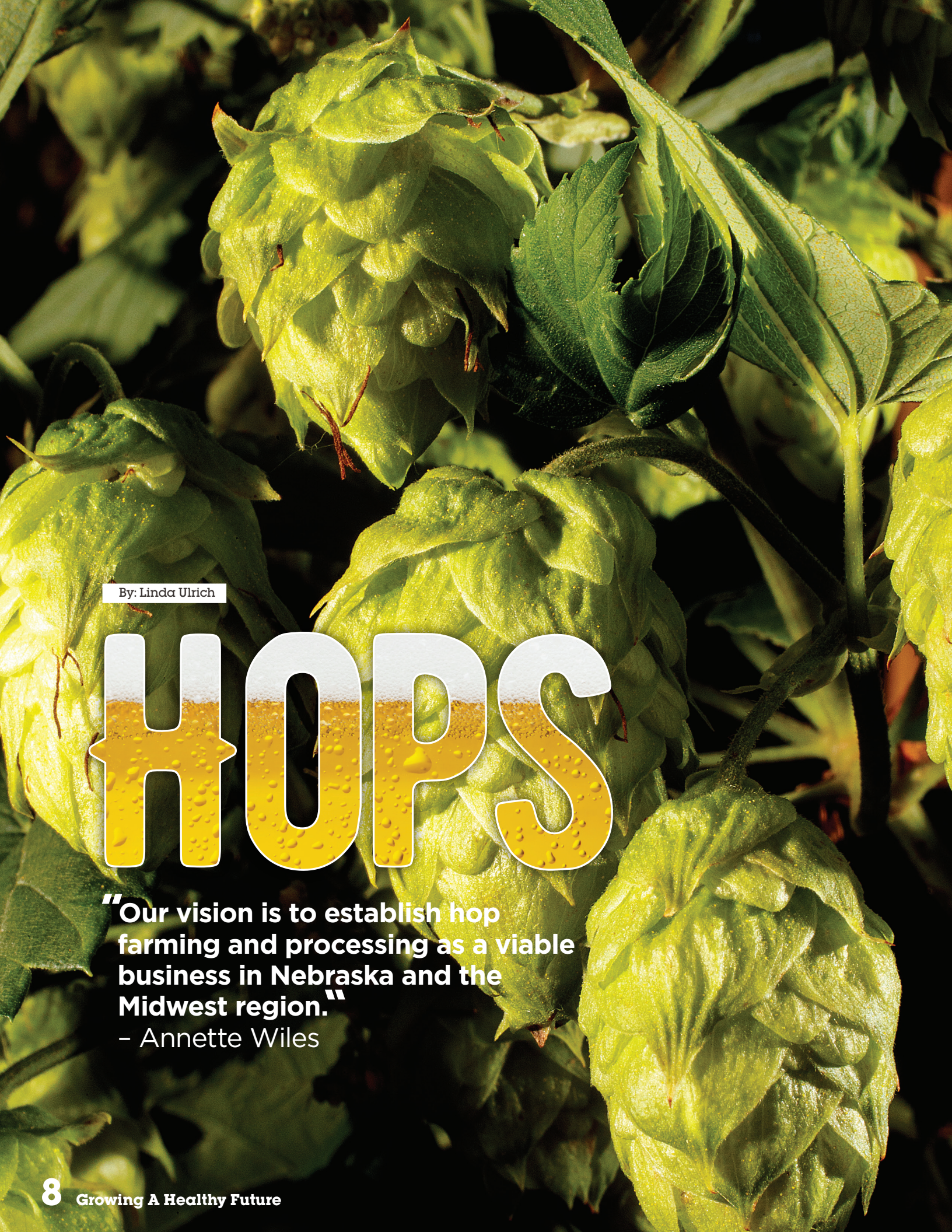
The Nebraska Food for Health Center grew out of a challenge from Jeffrey Raikes to “think bigger.”

When a group of University of Nebraska scientists discussed ways to further develop their research on the relationship between microorganisms in the digestive tract with our diets, Raikes, a Nebraska native and former Microsoft executive, repeatedly challenged them to think bigger.

Raikes envisioned “Agriculture 2.0,” an endeavor that would connect Nebraska agriculture with improved health for people worldwide. The result is the Nebraska Food for Health Center, a \$40.3 million collaboration of researchers across the university system, food and drug manufacturers and philanthropists.

Through their foundation, Raikes and his wife, Tricia, committed a \$3 million gift to the University of Nebraska Foundation to help

launch the center. That gift includes a \$1 million challenge grant. In recognition of Raikes’ service as chief executive officer of the Bill and Melinda Gates Foundation, the Gates foundation also made a \$2 million gift to support the center. University funding includes \$19 million over five years and \$20.5 million in private donations.



BREWING UP A PARTNERSHIP



Bruce Wiles and crew celebrate a bountiful harvest.



By: Linda Ulrich

HOPS

“Our vision is to establish hop farming and processing as a viable business in Nebraska and the Midwest region.”
– Annette Wiles

While it is unlikely that fields of hops will ever be as common as fields of corn, soybeans and wheat, Annette Wiles and her husband, Bruce, think that hops, the plants that provide the chemicals used in beer brewing for flavor and aroma, can be a good alternative crop for Nebraska.

“Our vision is to establish hop farming and processing as a viable business in Nebraska and the Midwest region,” she said.

The increasing interest in craft beers is creating more interest in locally sourced ingredients, including hops. The Wileses grow hops themselves but they also want to establish a well-managed hop enterprise that will provide other growers with a high-value crop produced on small acreages ranging from ¼ to 10 acres. They

want to do this within a system that returns the majority of the crop value back to the grower while using sustainable practices.

Annette and Bruce, who farm near Plattsmouth, are collaborating with the University of Nebraska–Lincoln to grow their start-up companies:

- Nebraska Hop Yards, where their hops are grown;
- Midwest Hop Producers, which focuses on the milling, pelletizing and packaging of hops and hops sales to brewers; and
- Midwest Hop Yard Supplies, which sources supplies and materials needed for hop yard trellis systems and other equipment to growers.

The Wileses have provided funding for hops trellis systems, cultivar research and lab testing services in the university’s Department of Agronomy and Horticulture. In addition to hops, baby ginger, another ingredient used in some beers, has been grown in an East Campus greenhouse from seed imported from Hawaii.

By using Nebraska Department of Economic Development grants and partnering with the university’s Department of

Biological Systems Engineering, prototypes for cost-effective and efficient hop dryers suitable for use in small hop yards have been constructed and are being tested prior to commercialization. Future research will include hop varietal development, including the wild hops found in Nebraska, and hop oil compounds research by the Department of Food Science and Technology’s Food Processing Center at Innovation Campus, Annette Wiles said.

Financial contributions by the Wileses helped organize a Nebraska Extension grower survey in support of an extension hop coordinator position. They also helped to establish the first Nebraska Hop Grower and Brewer Conference and Tradeshow. Additionally, they hold grower workshops, field days and scouting workshops.

Bruce, a third-generation farmer who previously managed 11,000 acres of corn and soybeans for more than 40 years, earned his associate’s degree in agricultural science from the university in 1977.

“Working with the university on hops is a way that we can give back,” Annette Wiles said. “I’m excited that people in Nebraska are interested in growing hops.”



University associate professor Stacy Adams is studying the potential of hops as a specialty crop.

“It’s a totally different cropping system, and it’s a lot more labor intensive than traditional field crops. You have to understand the end result before beginning to grow them.”

– Stacy Adams



HOPS: A SPECIALTY CROP RISING TO NEW HEIGHTS

Americans have long loved their beer, and a growing number of beer drinkers, particularly millennials, are quenching their thirst with craft beers.

Millennials, people born in the 1980s and 1990s, are interested in social dining experiences that often feature locally sourced foods, and craft beers fit well with that, said Stacy Adams, associate professor of practice in the Department of Agronomy and Horticulture at the University of Nebraska-Lincoln.

Accompanying the increased interest in microbrews is an increased interest in growing hops, a necessary ingredient in beer. Adams is researching the potential of hops as a specialty crop in Nebraska.

The harvested female flowers, called cones, grow on bines, lush plants that climb from their shoots by growing in a helix on ropes on heavy-duty cable trellises that can be suspended 12 to 20 feet aboveground. The cones have lupulin glands, which contain alpha and beta acids and essential oils that provide the bittering and unique flavors for beer. Hops also are used in the floral industry and in homeopathic medicine.

If the plants are successfully established and grown using best management practices, they can produce hops for more than 50 years, but growing them requires expertise because this crop is unique in its growth, cultivation, harvest and post-harvest handling. It also requires a significant financial investment, Adams said.

“It’s a totally different cropping system, and it’s a lot more labor intensive than traditional

field crops,” he said, “and you have to understand the end result before beginning to grow them.”

With the help of a grant, Adams has grown and evaluated eight hops cultivars across the state. The test plots are on the university’s East Campus and at Sutton, Norfolk and Scottsbluff. His goal is to determine how the varied growing conditions across the state affect the hops and which cultivars are most likely to be successful.

According to Adams, several potential problems can affect a hops harvest, including:

- Nebraska’s sometimes volatile weather, particularly wind and drought
- Pests, such as spider mites and caterpillars
- Diseases, such as downy mildew and alternaria cone disorder
- Access to the specialized harvesting equipment

What his research has found so far is that some cultivars of hops grow well in Nebraska and could be a viable, high-value specialty crop, but more research is needed.

“I am passionate about finding specialty crops that are not tied to commodity prices, which could provide income for rural families so they can live where they want to live in rural America,” he said.

By: Linda Ulrich



EXTENSION SHARES HOPS RESEARCH

Most hops in the United States are grown in the Pacific Northwest and Michigan, but Katie Kreuser sees great potential for hops as a specialty crop in Nebraska.

Kreuser is Nebraska Extension’s hop program coordinator. Since April, she has been sharing University of Nebraska-Lincoln research and other information with Nebraska hops growers and the hops industry.

Every day Kreuser answers questions from growers about various aspects of hops production ranging from the proper way to plant them to weed and disease management to the optimal time for harvest. She also communicates about hops through Facebook, Twitter and her blog, The Nebraska Bine Times. Coordinating workshops and other educational events also is part of her duties.

“Building relationships across the state and helping growers be successful in hop production is really what drives me,” she said. “It’s really exciting that there’s a lot of interest and growth in the Nebraska hops and craft beer markets.”

By: Linda Ulrich

For more information or to contact Kreuser:

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CAPITALIZING ON EFFICIENCY AND OPPORTUNITY IN EASTERN NEBRASKA

By: Haley Apel

The challenge of feeding a surging population with less resources demands an increase

in efficiency. Efficiency in water use, efficiency in reducing food waste and efficiency in land usage. In order to meet these challenges, the University of Nebraska-Lincoln must also efficiently use its resources.

To better integrate research and extension programs, a reorganization of university resources has occurred in the eastern one-third of Nebraska,

home to 70 percent of the state's population.

"This reorganization was about leveraging strengths in eastern Nebraska and capturing new opportunities," said Agricultural Research Division Dean Archie Clutter. "We've always been active with research and extension in this region. Reorganizing allows us to better integrate those projects and deliver them in more efficient ways to a larger population."

The new region comprises 53 counties, including the highly populated urban areas of Lincoln and Omaha.

The headquarters for the new formation, the Eastern Nebraska Research and Extension Center, is located near Mead, at the facility

formerly known as the Agricultural Research and Development Center. The South Central Agricultural Laboratory, Haskell Agricultural Laboratory, Barta Brothers Ranch and Kimmel Education and Research Extension Center are also included under ENREC's collaborative structure.

"ENREC's proximity to urban populations and the entire student body of the university brings an opportunity for greater engagement around agriculture and natural resources settings," Clutter said.

The variety of research and extension programming in eastern Nebraska is vast. From plant breeding and beef systems, to community vitality and youth development. The goal of the reorganization is for more research

and information concerning these areas to be delivered quicker and in new ways to the public.

"Educating the public on the uphill battle we face in food security is crucial to be able to address the challenges we face. These challenges affect us all, in both rural and urban settings, but we have to start to engage with these groups in different ways in order to deliver our messages," said Chuck Hibberd, dean of Nebraska Extension.

While maintaining the face-to-face communication practices so many of extension's clients are used to, according to Hibberd, extension has also increased its use of technology to deliver science to urban audiences. Online videos, social media and blogs are now all included in extension's toolbox for communicating with Nebraskans.

"There are over a million people living in and around Lincoln and Omaha. As these

continued on page 14

"This reorganization was about leveraging strengths in eastern Nebraska and capturing new opportunities." – Archie Clutter



ACTION IN THE METRO: Extension service garden providing HOPE for the hungry

A one-fifth of an acre plot of land at Faithful Shepard Presbyterian Church, near 165th Avenue and West Center Road in Omaha, is providing nutritious produce to Omaha's food insecure. Each year, Nebraska Extension's HOPE Garden donates 4 to 5 tons of produce to a local food pantry. HOPE stands for "Helping Omaha's People Eat."

The garden is managed by master gardeners certified by extension. A crew of 20 master gardeners tends to the garden each Tuesday and Friday from March through October. On those days, Heartland Hope Mission picks up the harvested produce to immediately distribute through the food pantry.

"In 2016 we donated over 5 tons of produce to the Heartland Hope Mission and we're on track to top that amount this year," said Kathleen Cue, horticulture program coordinator with Nebraska Extension in Douglas and Sarpy Counties. "Our master gardeners have really taken ownership of this garden and that's resulted in more food for Omaha's hungry."

The church has provided all of the land and water for the garden since it began in the early 2000s. In the beginning, only tomatoes and zucchini were planted. The master gardeners sought feedback from the pantry on demand and ethnic preferences, and over the years have added specialty items such as okra and aronia berries. They've also adopted intensive gardening techniques that allow for rotating harvests.

The HOPE Garden is one of 13 gardens in the metro area managed by master gardeners. HOPE is the only garden managed exclusively for food production purposes. The others are used primarily as demonstration gardens.

By: Haley Apel

areas continue to grow it's critical that we have a wide variety of ways we can engage with them," said Hibberd.

Justin McMechan is a cropping systems specialist at ENREC. His responsibilities include extension and research programs focused on eastern Nebraska rainfed and irrigated production systems. McMechan has bought into the new reorganization because of its focus on increasing communication opportunities with the public.

"Collaboration and exchange of information with consultants and producers is critical to fostering a dialogue to determine, address and develop solutions for key issues in eastern Nebraska," McMechan said.

Reorganizing its resources across the state is just one way the University of Nebraska-Lincoln has shown its commitment to the land-grant mission. From the rancher in the Sandhills to youth in Omaha, the university continues to explore opportunities to efficiently engage with all people of the state. With more programming delivered across more platforms than ever before, Nebraska has truly become a living and learning laboratory.

To learn more about ENREC, visit extension.unl.edu/statewide/enrec/.



World-Class Research: Plant Phenotyping Research Takes Flight

The University of Nebraska-Lincoln's target on the challenge concerning food security has resulted in an increased focus on areas such as plant breeding, and disease and drought tolerance. One of the best ways to study these complex challenges is through plant phenotyping, a method of studying complex plant traits, or phenotypes.

In the spring of 2017, Nebraska installed its first field phenotyping facility at the Eastern Nebraska Research and Extension Center. The facility features an automated cable suspended carrier system that holds multiple cameras and sensors, which take high resolution images of crops. The site is also equipped with an advanced automated weather station, and state-of-the-art subsurface drip irrigation for water and nutrient delivery and manipulation at the plot level.

This is the third phase in Nebraska's phenotyping research, which started out relatively small, with a chamber-size scale at the Beadle Center in Lincoln before advancing to greenhouse scale phenotyping at Nebraska Innovation Campus.

"There's a lot of people doing plant phenotyping, but what makes Nebraska unique is being able to build capacity across these different scales and integrate teams across those scales," said Archie Clutter, dean of Nebraska's Agricultural Research Division.

The one-acre imaging area is currently planted with maize and soybeans.

"This translational research allows us to transfer approaches and discoveries from the greenhouse to the field. In order to make a real impact, all of our research must be tested in the field, which is what the new field system at ENREC allows us to do," said Yufeng Ge, assistant professor in the Department of Biological Systems Engineering.

According to Ge, one of the major impacts this system could bring to Nebraska is through plant breeding. A common breeding cycle from germplasm selection to the release of a variety is typically 7-12 years. Research at the field phenotyping facility can shorten this cycle, meaning better varieties could be released at a faster rate.

By: Haley Apel



CASNR SURGES FORWARD AS INDUSTRY DEMANDS MORE SKILLED GRADUATES

By: Haley Apel



W

hen the University of Nebraska Board of Regents established the College of Agriculture in 1872, it did so with little enthusiasm. At that time, there was a general intolerance of “book farming” among farmers and non farmers. The teaching of farming in schools was regarded as a somewhat futile task.

Fast forward 145 years, and the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln is experiencing record enrollment for incoming students and producing a record number of graduates.

So what has changed?

“Our global society is counting on us to feed a growing population while preserving our natural resources for future generations. The need to sustainably feed a growing population is no longer just a challenge for the agricultural industry – it’s a challenge for our global society,” said Tiffany Heng-Moss, interim dean of CASNR.

This widespread challenge is why the demand for skilled graduates in food, agriculture, renewable resources and STEM is on the rise. Between 2015 and 2020, the United States Department of Agriculture expects 57,900 annual openings for graduates with bachelor’s degrees or higher in those areas. It’s timely then, that CASNR produced its highest number of graduates in 2016 at 563.

“CASNR’s enrollment numbers reflect our commitment

to attracting and retaining students who will make a difference in our shared future,” said Heng-Moss. “Our goal is to foster an inclusive environment that empowers students to be difference makers in the college, the state and the world.”

Not only is CASNR producing its most graduates in history, but those graduates are prepared to work in a wide variety of fields. Students are prepared for careers in everything from animals to plants, soil to climate, golf to business, mechanization to leadership and food to forensic science.

While students have a wide range of different career paths to pursue, CASNR ensures that science is at the root of their learning. “Science Literacy 101: Science and Decision-Making for a Complex World” is the foundational course for all

CASNR students. The course introduces students to the scientific, social, economic, political, cultural and ethical dimensions of current issues related to food, energy, water and landscape systems.

“A lot of the science knowledge we learn happens out of context of why we should truly care about it,” said Jenny Dauer, lead instructor of the course and assistant professor in the School of Natural Resources. “In this course we use socioscientific issues as the background for students to practice systems thinking and decision-making about difficult topics.”

Once they have completed Science Literacy 101, students can take their systems thinking to the feedlot while conducting ruminant nutrition research, or in the Department of Agricultural Economics commodity trading room, which provides students real-time access to commodity markets. Or maybe they’ll implement their systems thinking while studying in Australia learning about the

unique biodiversity of the continent.

It’s a good thing the scope and acceptance of “book farming” has expanded over the past 145 years, because the challenges facing the planet have also expanded. As CASNR looks forward to its next 145, the college is focused on turning those challenges into opportunities.

“Our goal is to foster an inclusive environment that empowers students to be difference makers in the college, the state and the world.”
– Tiffany Heng-Moss

Between 2015 – 2020, the U. S. Department of Agriculture expects 57,900 job openings for graduates with bachelor’s degrees in the areas of food, agriculture, renewable resources and STEM.

INNOVATIVE TEACHING AND LEARNING IN CASNR

By: Haley Apel

Now in its 145th year, the College of Agricultural Sciences and Natural Resources is committed to preparing today's students for tomorrow's greatest challenges. To do so in today's rapidly changing environment, CASNR is prepared to think outside of the box when it comes to teaching and learning.

CASNR offers a wide range of unique opportunities for undergraduate research, entrepreneurship development, international experiences and collaborative relationships with faculty, staff and fellow students. Below is a small sample of the innovative and interdisciplinary approach CASNR has taken to provide students with an engaging, energizing, individualized educational experience, and prepare them to make a difference in Nebraska and around the world.

- Faculty-led education abroad experiences have been held in 17 countries around the world, including Puerto Rico, Botswana, Scotland, Spain, China and Australia.
- Each year, a number of CASNR undergraduates participate in the Undergraduate Creative Activities and Research Experience program, which gives them the opportunity to work in research one-on-one with a faculty research adviser.
- CASNR is helping students make the most of their time at Nebraska by developing learning communities. In addition to students with shared academic interests living together, they're also enrolled in shared courses, have access to an upper class student mentor and work with a faculty sponsor.
- Through the integrated science program, students have the opportunity to design their own degree. With the mentoring of a faculty advisory committee, students focus their degree and select courses across multiple concentration areas to create an individualized and interdisciplinary program of study.
- International student enrollment in CASNR has increased significantly. IANR has developed a number of new partnerships with partners around the world to expand international programming focused on the shared goal of preparing students as leaders for a future in which demands on food, energy and water systems will challenge sustainability.

CASNR faculty are creating innovative and transformative educational experiences that prepare students for careers addressing global challenges. The college's focus is not on preparing students for their first job, but positioning them to have a lasting and impactful career that aligns with their passion.



N | 
EXTENSION

NEXT CHAPTER AT NEBRASKA

Next Chapter at Nebraska is a college readiness program that helps students prepare for and succeed in college by providing the skills students need to reach their academic goals. The program is facilitated through Nebraska 4-H.

The program is offered to students beginning in the 8th grade. Throughout high school, Next Chapter scholars will engage in events, activities and curriculum where they will participate in career exploration, develop research skills and experience a variety of learning methods that will help them transition to and succeed in college.

"Through Next Chapter at Nebraska, not only do we want to inspire youth to choose to continue their education after high school, but also ensure that they succeed once they start college," said Nebraska 4-H Program Administrator Kathleen Lodi.

Next Chapter at Nebraska is a collaborative effort between Nebraska 4-H and the Office of Admissions at the University of Nebraska-Lincoln. For more information, visit admissions.unl.edu/nextchapter.

NOTABLE EVENTS THROUGHOUT CASNR'S 145 YEAR HISTORY



1872 - The University of Nebraska Board of Regents establishes the College of Agriculture.

1872

1954 - An international programs branch of the college is established.



1957 - Burr and Fedde Halls are constructed on East Campus, offering on-campus living for College of Agriculture students.

1974 - The University of Nebraska Institute of Agriculture and Natural Resources is established.

1997 - CASNR undergraduate honors research is created, which led to the campus-wide UCARE program in 2000.

2000 - Master of Agriculture degree added.

2006 - The Professional Program in Veterinary Medicine, a joint program with Iowa State University, is established.

2016 - CASNR produces 563 total graduates, its largest number of skilled graduates ready to enter the workforce.

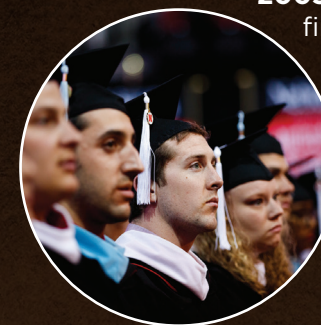
2017

1919 - The Nebraska tractor test law passes, stating that no new tractor could be sold in Nebraska without first being tested by the University of Nebraska's agricultural engineering department.



1964 - The College of Agriculture honors program is launched, which led to a superior university-wide honors program that exists today.

1990 - The college name is changed to the College of Agricultural Sciences and Natural Resources.



2005 - The first CASNR Salute to Graduates is held.

2017 - The Massengale Residential Center and Veterinary Diagnostic Center open on East Campus, reinforcing the living and learning environment.



As Nebraska's land-grant institution, the Institute of Agriculture and Natural Resources at the University

of Nebraska-Lincoln combines research, teaching and extension in a multidisciplinary, collaborative environment.

This combination ensures the best thinkers and experts from across the university work collectively, rather than independently, to ensure Nebraska's competitiveness in a world of challenges and change.

By: Hatley Apel

in a department-centric model and formed those communities was an important moment in the history of IANR.”

Establishing communities is not enough. Bringing big ideas to reality also takes a great deal of investment and IANR has doubled down. There are dozens more tenure track professors in the institute today than in 2011. Each of those additional faculty members is driving research, teaching and/or extension in IANR's communities.

“We believe in our shared vision and more than that, we believe in our people,” said Boehm.

reside in, but based on the impact they are working toward in one or more of the communities.

IANR's vision for a prosperous land will not be achieved overnight. After all, it's taken six years to establish a working structure to support the communities. There will be short-term and long-term strategies, but IANR is in it for the long haul. Boehm is ready to lead IANR to make big impacts on the state of Nebraska.

“We've reaffirmed our shared vision, invested in it and built a structure to support it. Now it's time to walk the talk. It's also time to start

IANR'S BOLD VISION FOR THE FUTURE OF NEBRASKA

This collective thinking has led IANR to prioritize the areas of stress biology, healthy humans, healthy agricultural production and natural resources systems, computational sciences, drivers of economic vitality for Nebraska and science literacy. These communities initially took shape in 2011. At that time, unit leaders with input from their faculty came together and rather than focus on individual needs, they agreed on areas of strength they felt the institution as a whole could build upon.

“It says a lot about the IANR community,” said IANR Harlan Vice Chancellor Mike Boehm. “I think we'll look back years from now and say that the moment we stopped operating

Beyond an investment in human capital, IANR is taking steps across all areas to ensure alignment with the six communities. This includes facility improvements such as the Veterinary Diagnostic Center, rewriting curriculum and developing new working structures within individual units. For instance, Nebraska Extension has developed 18 issue teams to ensure their work is feeding the communities and ultimately helping Nebraskans address new challenges.

Now that a structure is in place that aligns with IANR's priorities, communities of practice have formed. There are now groups of faculty members who feel connected to each other, not based on which department they

engaging our constituents and supporters in our vision for the future.”

To learn more about IANR's communities, please visit go.unl.edu/GrowingNebraska.

COMPUTATIONAL SCIENCES

Striving to efficiently and effectively analyze and report large sets of high-quality data in ways that we can easily share with the public.

“As a member of the Agricultural Data Coalition, we are helping farmers better control, manage and maximize the value of the data they collect every day in their fields. The development approach taken by the Agricultural Data Coalition will serve as an industry model for adding value to small and large farm operations with respect to agricultural data, privacy, access and utilization.”

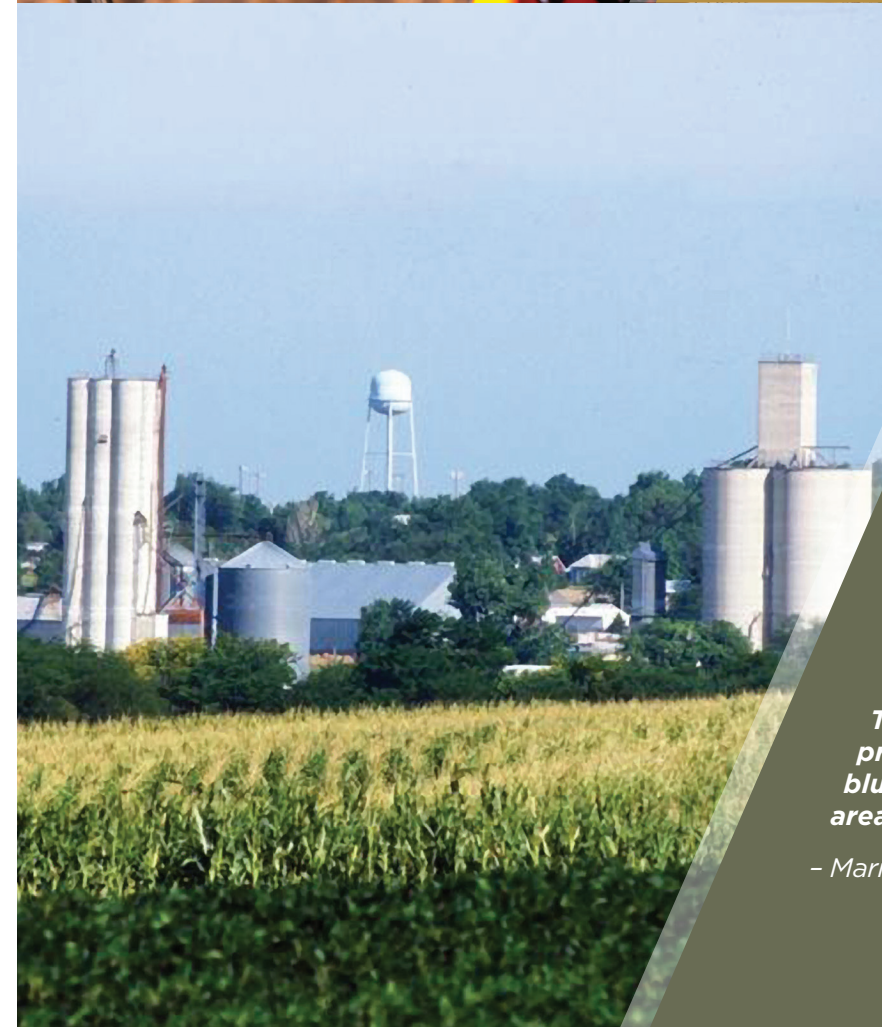
– Joe Luck, associate professor, biological systems engineering

DRIVERS OF ECONOMIC VITALITY FOR NEBRASKA

Strengthening Nebraska's entrepreneurial approaches to stimulate economic development and increase the vitality of Nebraska's communities and the quality of life of its people.

“Stronger Economies Together is an economic development planning effort designed to help community leaders explore their regional economic advantages and strategically build on economic strengths. Through faculty-led discussions and planning processes, regional leaders create an economic blueprint designed to enhance opportunities for area businesses, communities, and individuals.”

– Marilyn Schlake, extension educator, Nebraska Extension



SCIENCE LITERACY

Encouraging members of society to analyze complex challenges and make science-informed decisions in real-world situations.

“Streaming Science is a student-driven science literacy program highlighting the work of scientists conducting critical agricultural and environmental research in Nebraska. Through videos, podcasts and online field trips, our students increase awareness of scientific issues while getting practical experience.”

– Jamie Loizzo, assistant professor, agricultural leadership, education and communication

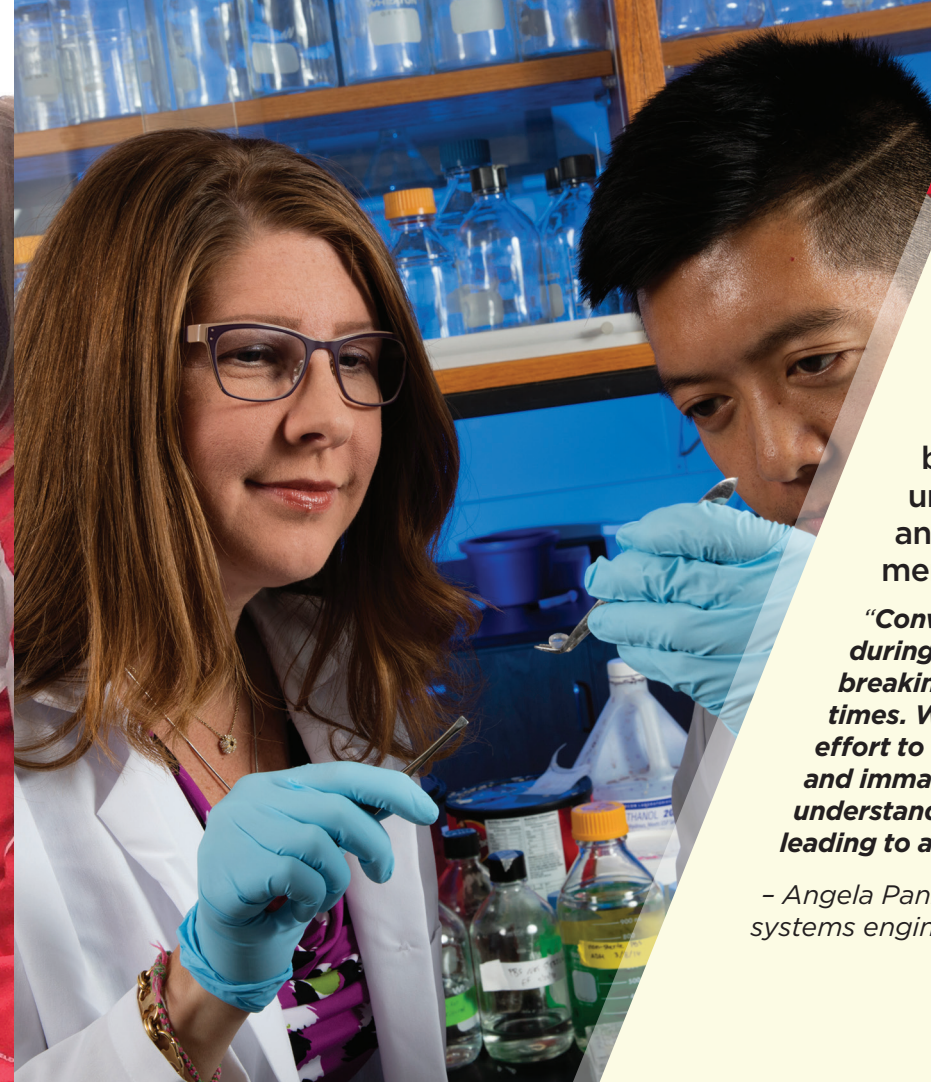


HEALTHY HUMANS

Establishing a research-based understanding to advance human health in relationship to healthy communities; we are conducting studies along a continuum from basic biomedical research directed to understand disease to nutritional foods and strategies that promote physical and mental well-being.

“Conventional treatment of growth plate disorders during childhood and adolescence often involves breaking and resetting a bone, sometimes multiple times. We have documented the first successful effort to establish communication between mature and immature cartilage cells, a necessary step for understanding cartilage and bone growth ultimately leading to a quicker recovery.”

– Angela Pannier, associate professor, biological systems engineering



STRESS BIOLOGY

Improving production, health, and well-being for animal, plant, and human systems; we are working to better understand how organisms and systems adapt to stressors such as drought, insects, heat and cold.

“By researching the effects of high nighttime temperatures on wheat and rice, we’re hoping to gain a better physiological and genetic understanding of the heat stress responses. This knowledge will drive the development of crops that are more resilient to higher temperatures in terms of yield and quality.”

– Harkamal Walia, associate professor, agronomy and horticulture



HEALTHY AGRICULTURAL PRODUCTION AND NATURAL RESOURCES SYSTEMS

Building on our expertise in soil health, water resources, ecology, risk analysis, and plant and animal systems, we are helping Nebraskans develop resilient agricultural production and natural resources systems.

“The idea behind One Health is a comprehensive approach to health, and we’re relying on Nebraska’s extensive network of research, teaching and outreach programs both within and beyond the state to advance our understanding of these systems.”

– Elizabeth Van Wormer, assistant professor of practice, School of Veterinary Medicine and Biomedical Sciences



DEVELOPING FUTURE LEADERS IN INTERNATIONAL TRADE

A renowned trade expert and Nebraska alumnus, Clayton Yeutter made a \$2.5 million leadership gift through outright and planned gifts to establish the Clayton Yeutter International Trade Program Fund at the University of Nebraska Foundation.



Clayton Yeutter

Yeutter, who died in March at age 86, held three cabinet-level posts for two U.S. presidents. He was counselor for domestic policy and secretary of agriculture for President George H.W. Bush and U.S. trade representative for President Ronald Reagan. Most recently, Yeutter was senior adviser of international trade for Hogan Lovells, LLP, in Washington, D.C., one of the nation's oldest and largest law firms.



“His work formed a good foundation that guides the way we negotiate in a global marketplace, and I look forward to using the lessons I learned from Clayton to help launch the institute.”

– Darci Vetter

Developing future leaders in international trade and global finance will be one of the primary goals of the Clayton Yeutter Institute of International Trade and Finance at the University of Nebraska-Lincoln.

Darci Vetter, former chief agricultural negotiator at the Office of the U.S. Trade Representative, will help fulfill Yeutter’s vision for the institute by serving as diplomat in residence.

“His work formed a good foundation that guides the way we negotiate in a global marketplace, and I look forward to using the lessons I learned from Clayton to help launch the institute,” she said.

In her new role, Vetter will work with leadership from the university’s College of Law, College of Business and Institute of Agriculture and Natural Resources to launch the institute. It will include three endowed chairs: the Duane Acklie Chair in the College of Business; the Michael Yanney Chair in the Institute of Agriculture and Natural Resources; and the Clayton Yeutter Chair in the College of Law. Vetter also is planning a lecture series and will help develop the role of the institute’s permanent director.

“I think there is a lack of understanding or even misunderstanding of how critically important trade is for the Nebraska economy,” said Vetter, who grew up on her family’s Hamilton County organic farm.

“We will be developing the next generation of critical thinkers who can analyze and see both the good and the bad of complex international trade issues, and who can make good choices and impact the course of trade policy.”



Darci Vetter

As chief agricultural negotiator from 2014 to 2017, Vetter led bilateral and multilateral trade negotiations on agriculture, including negotiating the Trans-Pacific Partnership agreement’s agricultural package. Before her appointment at USTR, she oversaw USDA’s export promotion and international development programs as deputy under secretary and advised the Senate Finance Committee on trade issues related to agriculture, the environment and labor. Currently she works as a consultant for companies and associations engaged in international food and agricultural trade.





Ag Honors alumnus Ben Steffen was one of the recipients of the Masters Week award.



ALUMNI MASTERS WEEK

Steffen shares his knowledge with students at Alumni Masters Week

Ben Steffen, a 1984 ag honors graduate, was one of the outstanding alumni who returned to the University of Nebraska-Lincoln to share his agricultural knowledge and experiences with students as part of the annual Alumni Masters Week.

The Masters Week award is granted to outstanding alumni who have shown great promise, success and leadership in their chosen life's work. Steffen and his wife, Paula Sue, operate a diversified dairy and crop production farm near Humboldt.

Alumni Masters Week is sponsored by the Nebraska Alumni Association, the Student Alumni Association and the university's Chancellor's Office.

and his church. A longtime member of the University of Nebraska President's Advisory Committee, Steffen served on President Bounds' Chancellor Search Advisory Committee and is a delegate to the Council for Agricultural Research, Extension, and Teaching, advocating for federal support for land-grant universities.

Ben and Paula Sue have worked extensively with cover crops and no-till cropping systems and have hosted Nebraska Extension field day demonstrations, a long-term CenUSA research project focusing on the viability of switchgrass as a biofuel, and numerous tour groups at their farm.

"It's a privilege to help the university. It's valuable for the state and for our community."

- Ben Steffen

As an advocate for agriculture, Steffen has testified before the United States' Senate Agriculture Committee and before the Nebraska Legislature. He is past president of Agriculture Builders of Nebraska, past president of the Nebraska Association of County Extension Boards and past member of the Richardson County Bank Board of Directors, his local Board of Education and the Richardson County Planning Commission. He continues in Nebraska Farm Bureau leadership roles and is chairman of the Richardson County Rural Water District 1.

It doesn't seem like Steffen would have much time for fun but his hobbies include singing in a barbershop quartet, directing the Humboldt United Methodist Church Choir, performing magic and flying.

None of this would be possible without the help of Paula Sue, who earned a degree in accounting from the College of St. Mary and handles all of the farm finances, including grain sales and futures contracts, keeps the dairy herd records and drives a combine during harvest.

"I married a really excellent partner and friend. We enjoy working side by side," Steffen said.

The Steffen crew at the end of the silage season a few years ago — "We look a little bedraggled but triumphant to have survived," Ben Steffen said.



TEAMWORK MAKES FAMILY DAIRY FARM THRIVE

By: Linda Ulrich

he most important part of Ben Steffen's dairy farm is the people.

The cows and crops are, of course, essential in his diversified dairy and crop production farm near Humboldt,

but it's the relationships and teamwork with his wife, Paula Sue, and their employees that he values most.

The Steffens have four full-time and two part-time employees and five or six family members working with them. "In our operation we're a team. No job is unimportant," said Steffen, a 1984 University of Nebraska-Lincoln ag honors graduate. "We're a group of people who enjoy working together who find ways to grow the business, survive and thrive."

Soon after Steffen graduated from the university, his parents, Dick and Sue, turned over management of the farm to him and

Paula Sue. "Oddly enough I was not one of those people who at age 5 knew what they wanted to do," he said, but returning to the farm and managing and growing the operation with his parents and wife is a decision that he's never regretted.

"My university education was empowering and gave me a sense of the possibilities. I knew I hadn't learned everything but I knew I could find challenges and do problem solving," he said. "It gave me the confidence to start my career."

His university studies not only gave him a valuable education in all facets of agriculture, it also helped him develop the communication skills he uses daily.

While working as a residence hall assistant for two years, "I learned excellent human relations skills, and it was a tremendous experience in leadership training," Steffen said.

He has used those skills not only on the farm but in numerous leadership roles for the university, agriculture-related organizations, his community

Much to Celebrate!

Greetings from the CASNR Alumni Association! I hope this fall has been a safe and abundant one for you and your loved ones. It is my pleasure again to write to you on behalf of our College of Agricultural Sciences and Natural

What a summer in Lincoln! Besides the once-in-a-generation Eclipse, we also witnessed another generational defining event: the Burr-Fedde and Friends Reunion.

This was a fantastic celebration that reunited former classmates and introduced many generations of East Campus residents to one another. While it is always sad to see proud remnants of the past go, it is equally as exciting to see the new, gorgeous Massengale Residential Center open and witness the installation of more bricks in the Legacy Courtyard. Thank you again to everyone who has purchased a brick. This is a great way to leave your mark on East Campus, and it is our association's number one fundraiser. The funds go towards scholarships for outstanding CASNR incoming students and other programs that help to ensure future success for our college.

Resources Alumni Association. These continue to be exciting times for the college. I would like to congratulate our newest CASNR graduates and CASNR Alumni Association members. This past cycle — combining December, May and August graduates — had the largest number of graduating students in our history. These positive numbers are possible thanks to our outstanding faculty, alumni and supporters.

In addition, we would like to thank all of the CASNR alumni who have come out to socialize at our events during the past year. We had a great time at Bolo Brewing in Valentine, Thunderhead Brewing in Kearney, Blue Blood Brewery in Lincoln, the annual Ice Cream Social and Pep Rally at the Nebraska State Fair and during our CASNR Football Tailgate this past September. We raised \$2,670 thanks to our amazing members and friends who attended the tailgate.

We are always on the lookout for good venues and opportunities to reconnect with our members and our alumni. If you have any ideas or suggestions, please contact Meg Kester at meg.kester@unl.edu. We would love to hear from you!

In conclusion, thank you for all you do for the College of Agricultural Sciences and Natural Resources, and our CASNR Alumni Association. We are all full-time ambassadors of the college and the university, so I hope to remind everyone of our responsibility to represent the "N" and to encourage our children, friends and neighbors to consider CASNR as they look to the future. The network I began over 20 years ago still adds value to my career, and makes me smile. We all have so many great memories, so please continue to sell our industry and all we represent. We look forward to hearing from you and seeing you soon!

Respectfully,

Erik Hoegemeyer
CASNR Alumni Association
President
Ag Econ 1999



Erik Hoegemeyer

The Burr-Fedde and Friends Reunion

Thank you to the 350 people who attended the Burr-Fedde and Friends Reunion! Attendees included residents from every decade since Burr and Fedde were built in 1957, and came from as far away as Kodiak, Alaska. It was a great way to celebrate the memories of Burr and Fedde, and honor the unique bond formed by East Campus students!



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GLOBAL FOOD SECURITY: THINKING GLOBALLY ACTING LOCALLY

Donnie Smith
January 9, 2018 | 7:00 PM
Nebraska Innovation Campus
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You can see more information here: heuermannlectures.unl.edu



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