Growing

A HEALTHY FUTURE

IANR

FOOD • FUEL • WATER • LANDSCAPES • PEOPLE

IANR Is Doubling Down

Ronnie D. Green, University of Nebraska Vice President and Harlan Vice Chancellor, IANR

We live in exciting and challenging times.

We face the daunting challenge of innovating our agriculture and food system to meet the needs of a rapidly growing, longer-living and more affluent global population that wishes to purchase more food and animal protein at a time we have less tillable land, more water concerns, and strongly competing needs for renewable energy.

These tremendous challenges fall within the University of Nebraska Institute of Agriculture and Natural Resources' mission, as well as across a multitude of other disciplines throughout our University. The innovations required to meet these current and future needs in a sustainable, healthy way are the impetus for your land-grant University "doubling down" on investments within IANR to grow a healthy future.

Happily, our need to grow occurs during a renaissance for Nebraska agriculture, which has experienced unprecedented growth and prosperity in recent years.

Demand for our College of Agricultural Sciences and Natural Resources graduates is unparalleled. We've seen CASNR enrollment increase 67.5 percent over the past eight years while maintaining the highest graduation rate of any UNL college. Data for the incoming fall 2013 class indicates another substantial increase in both undergraduate and graduate enrollment.

Our research programs have experienced tremendous growth in external funding, with a 20 percent increase in the past year. There's also tremendous growth in private giving for IANR programs through the University of Nebraska Foundation. Plus, our agricultural operations across the state have performed well financially. These successes grow from IANR's outstanding, world-class faculty and staff, along with the unwavering commitment of many Nebraska stakeholders supporting our efforts.

Collectively all these things, along with the continued support of our state and federal partners, are allowing us to double down on an investment in new positions to help grow a healthy future for Nebraska and the world.

We in IANR have worked hard over the past 18 months as part of our IANR to 2025 efforts to make internal changes that position us to invest significantly in additional faculty to grow our expertise and lead the nation in meeting the enormous agricultural challenges we face.

We're recruiting 36 new tenure-track faculty positions in key IANR priority areas, including plant and animal stress biology, healthy humans, agricultural science literacy, computational sciences and big data, and healthy agricultural production and natural resource systems (*ianrhome.unl.edu//growingianr*).

This increase of over 10 percent in our faculty ranks represents the largest increase in IANR faculty since the 1970s. We believe this strategic investment in Nebraska's and the world's future is unprecedented elsewhere in the U.S. land-grant university system.

NU is a long-recognized leader in agriculture, natural resources and human sciences. This investment firmly plants our flag as the committed world leader in teaching, research and service leading to sustainable food, fuel, water, landscapes and improved quality of life for people.

I am so proud that flag has a big red N on it, and count it a privilege every day to have the opportunity to serve in this phenomenal place. Thank you for your support.

Ronnie D. Green
NU Vice President and
Harlan Vice Chancellor, IANR

See Ronnie Green's blog and video on the President's Council of Advisors on Science and Technology (PCAST), and the role of land-grant institutions, at *ianrhome.unl.edu/pcast.*

Growing A Healthy Future

Spring 2013 Volume 2, Number 1

Growing A Healthy Future is published twice a year by the Educational Media unit at the University of Nebraska–Lincoln under the auspices of the University of Nebraska Vice President and Harlan Vice Chancellor of the Institute of Agriculture and Natural Resources.

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There is no charge for this magazine. Each issue describes IANR programs that benefit Nebraska and beyond. If you happen to receive more than one copy, please share with a friend.

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Beef apps

Two new UNL Extension beef apps can help producers better manage their beef cow herds to increase profitability.

Available in the Google Play and Apple App Store, NUBeef-BCS and NUBeef-UTS work through a series of pictures that allow producers to visually score body condition, udders and teats.

NUBeef-BCS is based on a numbering system that allows producers to score cows at important times throughout the year, such as during weaning, right before the start of breeding and 60 days prior to calving. NUBeef-UTS, based on the Beef Improvement Federation system, allows producers to score photos of teats and udders against the BIF standard.

See more about extension beef apps on YouTube

All fore students

When students graduate with a PGA Golf Management degree from IANR's College of Agricultural Sciences and Natural Resources, they not only know how to manage a golf course but an entire facility, including hospitality and restaurant management.

Students take three classes: catering, guest service management, and food and beverage management. Most golf facilities have food and beverage facilities, so students better understand what is involved.

Catering class students worked events such as the College of Education and Human Sciences Partners Legislative Day at the state Capitol and a preperformance reception at Lied Commons for William Shatner.

See more about UNL PGAM on YouTube

Combatting staph

IANR scientists are honing in on ways to combat staph infections, which most general practitioner doctors are seeing weekly, if not daily, in their patients.

Staph makes specialized molecules that take nutrients from infected patients, potentially causing death. These specialized molecules are called virulence factors, and they are made in response to changes in environmental and nutritional conditions.

UNL researchers are working on ways to trick staph into "thinking" they are in an environment where they are happy and don't produce virulence factors. As a result, people would stay healthier and billions of dollars could be saved.

This research also could have implications for the dairy industry, as staph bacteria cause mastitis in cows.

Corn challenge

The UNL Extension Innovative Youth Corn Challenge aims to keep 4-H and FFA members excited about growing the most economical, most environmentally sound and highest-yielding corn crops.

Youth gain hands-on experience and learn new and innovative methods to improve yields over the county average, and combat disease and drought. With funding from the Nebraska Corn Board, team participants and mentors test fungicides, nitrogen and growth enhancers, and experiment with other cultural practices.

Program goals are to provide data to producers, researchers and agribusinesses, and to encourage youth to pursue agricultural careers.

More on corn challenge

The Clark Enersen Partners

Nebraska Innovation Campus

Dan Duncan keeps a list of potential partners for the Nebraska Innovation Campus. On one recent winter day, he figured it was over 60.

"Those range from they're going to be there to probably unlikely but still worth considering," said Duncan, executive director of the 232-acre private-public research campus taking shape on the former Nebraska State Fairgrounds.

"For over a year I've been selling a PowerPoint," Duncan said. "That's all I've had to sell."

"People are out there looking right now for this kind of space."

With construction under way and commitment from the first private partner, Omaha-based ConAgra Foods, Duncan now has much more to sell than a hazy concept with pretty artist's renditions. He compares ConAgra's agreement to efforts to fill a shopping mall by landing that first big anchor store.

There's plenty of interest, Duncan said. "I could be leasing a lot of space now if we had it available. People are out there looking right now for this kind of space."

Phase I of construction will comprise about 300,000 square feet of space, divided among four buildings that will include lab, greenhouse and office space, a 400-seat conference room and a restaurant. The design incorporates two historic Fairgrounds structures – the 4-H Building and the Industrial Arts Building.

The Clark Enersen Partners

Twenty-five years from now, it's envisioned there will be 2 million square feet of space with up to 7,000 people "living, working and playing" there. That's a pace of about 80,000 square feet of new space a year, Duncan noted.

"This is a very aggressive growth plan."

Duncan said there's only about 96 acres of buildable space, so construction will have to average three stories in what will be a "dense urban-type environment," except with more green space.

Amenities such as restaurants, gym, dry cleaners and living space will be key too, he said.

Several University of Nebraska–Lincoln offices are expected to move to the campus by early next year, along with a new high-throughput plant phenotyping system.

Duncan said private industry will be drawn by the opportunity to work with university faculty and bright students. He said he also expects Innovation Campus to be a student recruitment draw.

"We're going to give students mechanisms to start their own businesses. We're going to have internships with these companies," he said. "I've heard from students who already own their own businesses who are interested in space where they could meet clients."

Yes, much more than a PowerPoint now.

Dan Duncan, 402-472-5535, *dduncan1@unl.edu*

Stories by Daniel R. Moser

2010

Jan. 1, 2010: UNL takes possession of former State Fair site

2011

Nebraska Legislature and Gov. Heineman approve $25 million in funding for NIC

2012

November 2012 – ConAgra announced as first private-partner tenant of NIC

2013

Life Science Complex – Demolition at former Industrial Arts Building completed May 2013, construction to be complete August 2014

2014

Former 4-H and Companion Building – construction started; estimated move in date Feb. 1, 2014

2040

Perhaps 2 million square feet of office and lab space, with up to 7,000 employees

More on Innovation Campus

NIC facts

Located on 232 acres of the old Nebraska State Fairgrounds	Initial funding of $25 million from Nebraska Legislature and governor	Focus: Food, fuel and water	Labs, offices, businesses and residences eventually to occupy space

"This is a very aggressive growth plan."

Sinclair Hille Architects

Nebraska-grown tomatoes

iStock

IANR researchers are working with ConAgra Foods to test the feasibility of growing processing tomatoes in Nebraska greenhouses.

ConAgra Foods, based in Omaha, is the first private business to announce plans to be a tenant of Nebraska Innovation Campus. The company already is using East Campus greenhouses in cooperation with UNL agronomists, horticulturalists and food scientists. Eventually, it will use space in the NIC greenhouses.

ConAgra Foods tomatoes are field grown in California for the company's Hunt's canned tomatoes line. If Nebraska greenhouses prove promising for growing tomato varieties used in canning, the company could conduct year-round research in Nebraska at every stage.

"We are discussing the possibility of doing some canning of these test tomatoes at the NIC. This would be everything from peeling the tomatoes, preparing them for the can and then steps needed for food safety of canned products," said Mike Parker of ConAgra Foods Research Quality & Innovation. "We see opportunity with the NIC when it comes to research and development on our Hunt's products."

So far, the project has one full-time staff person at UNL, with that likely to grow. In addition, two students are working on the project, through the UCARE (Undergraduate Creative Activities and Research Experiences) program.

"We believe there will be more opportunities as the NIC facility is built out," Parker said. "We are definitely excited about the opportunity to create a talent pool of students with experience on our products."

iStock

Hybrid popcorn research

ConAgra Foods will be popping up at the Nebraska Innovation Campus with research into popcorn hybrids.

Working with IANR scientists, the effort aims for more effective and efficient breeding of new commercial varieties for ConAgra's Orville Redenbacher's popcorn, said Mike Parker of ConAgra Foods Research Quality & Innovation.

Three full-time jobs are anticipated initially, as well as support staff, Parker said.

"The UNL research team is still determining which projects will be best for the program and once those are identified, there will be graduate-level positions needed to support this research," Parker said. "Additionally, there will be work opportunities in the popping lab and popcorn fields.

"We are very excited to be at the front of this innovation wave being created in Lincoln. We see huge value in leveraging the expertise and creativity that the university cultivates," he added.

More ventures between ConAgra Foods and UNL are likely.

"We're being very focused on the initial projects to ensure both sides understand how it will work and can show value delivered to their respective sides. ConAgra Foods has such a diverse portfolio, we definitely see opportunities for future exploration with UNL," Parker said.

Going with the grain

Terry Klopfenstein's first foray into the possibility of using distillers grains for cattle feed in the late 1960s was based on the idea of fermenting wheat because it was so cheap at the time.

"I put together a plan that never took off. It's a good thing that it didn't," Klopfenstein recalled. Instead, the fledgling field took its lead from the distilling industry in Kentucky, which was about adult beverages, of course, even landing some early funding from the whiskey industry for research.

At the time, cattle were fed corn, corn silage and alfalfa, but the industry was interested in the possibility of feeding a distillers byproduct, Klopfenstein said. Early research showed that with much of the starch removed, distillers grains were a better feed than corn.

"That was a tough sell to feeders," Klopfenstein said.

Later came another shift: In addition to being a source of protein, research showed, distillers grains could be a source of energy for cattle.

Over the decades since, the Institute of Agriculture and Natural Resources has been a leader in the field, thanks to Nebraska's unique mix of corn, cattle and ethanol production. IANR animal scientists long have been leaders in researching how best to use byproducts from ethanol production for cattle feed. Their pioneering studies in the 1990s proved the benefits of feeding wet byproducts to cattle instead of drying the material. Eliminating drying reduces ethanol production costs, reduces greenhouse gas emissions from the agricultural complex, and provides an economical, high-performance feed. This work transformed wet byproducts into a feedlot staple and helped develop Nebraska's ethanol industry.

Klopfenstein, now semiretired, has been the one constant presence in that research. In addition, his former students now are all over the country carrying the work forward as feeders and consultants.

Bill Dicke, who got bachelor's and master's degrees in ruminant nutrition from the University of Nebraska–Lincoln in the 1970s, founded Cattlemen's Nutrition Services LLC, based in Lincoln, one of the largest independent beef nutrition consulting firms in the nation.

Dicke said Klopfenstein's research and teaching have been key in making Nebraska a leader.

"We definitely use what we learned in graduate school over the years, and we continue to monitor research and follow the university's research very heavily," Dicke said.

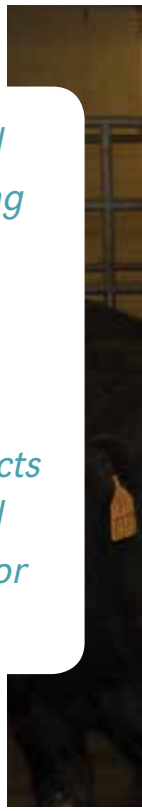
Klopfenstein's colleagues, including fellow animal scientist Galen Erickson, take university research to the industry through UNL Extension. In 2012, for example, Erickson advised consultants to use more corn silage in cattle's diets, in part to use drought-damaged corn. In fact, current IANR research is exploring working more corn silage back into cattle's diets after it was largely eliminated since the 1980s. "There's a synergy there between silage and distillers grains," Klopfenstein said.

Klopfenstein praised the Nebraska Corn Board, and the livestock and ethanol industries for being a key part of the partnership.

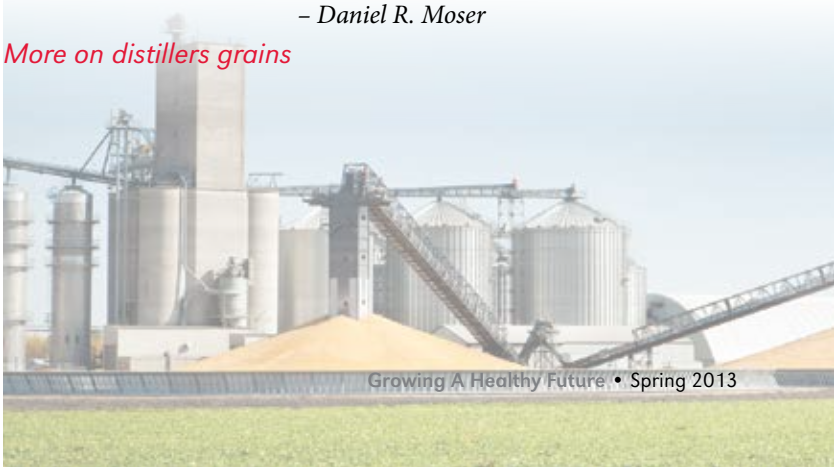
Terry Klopfenstein, 402-472-6443, *tklopfenstein1@unl.edu*

– Daniel R. Moser

IANR animal scientists long have been leaders in researching how best to use byproducts from ethanol production for cattle feed.



More on distillers grains



Nick Manes

Terry Klopfenstein has led UNL research into feeding ethanol byproducts.

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Removal of corn oil improves digestion in forage-based diets.

Striking oil

Institute of Agriculture and Natural Resources scientists are experimenting with distillers grains that have some corn oil removed, so the oil can be used in biofuels.

Animal scientists Galen Erickson and Terry Klopfenstein are comparing the effects of feeding condensed distillers solubles, and distillers grains plus solubles, with and without corn oil removed in steer diets.

Condensed distillers solubles (CDS) are a liquid byproduct and distillers grains plus solubles are a semi-solid byproduct, both from ethanol production. CDS are generally added back to distillers grains before feeding, but earlier IANR research found they can be fed separately in cattle diets.

Ethanol plants can remove some corn oil from the CDS; it can be sold for about 30-35 cents a pound to be developed into biofuels. So, IANR scientists wanted to determine how performance of cattle fed the de-oiled byproduct compares to that of cattle fed regular CDS or regular distillers grains plus solubles.

Findings so far are promising. Crude protein in the de-oiled CDS was slightly greater than in normal CDS, suggesting nutrient concentration may slightly increase when corn oil is removed. Scientists also found that when CDS are fed at a higher percentage of cattle diets, removal of corn oil improves digestion in forage-based diets. In feedlot diets, two experiments have shown either no impact or a slight decrease in value for finishing cattle. More work is under way.

– Daniel R. Moser

iStock

Water is center stage at

Skip-row planting can increase yields.

As drought continues to grip the state, water — or the lack thereof — has taken center stage.

At the West Central Water Resources Field Laboratory near Brule, Institute of Agriculture and Natural Resources scientists, staff and students conduct research and demonstrations while teaching water conservation methods in both cropping and livestock systems for western Nebraska.

The farm lab's precipitation and soil types are similar to those covering a large area of southwest and south central Nebraska, and near the Upper and Middle Republican Natural Resources Districts. There, farmers regularly face water use limitations, said Don Adams, director of the university's West Central Research and Extension Center at North Platte.

Since the University of Nebraska–Lincoln's purchase of the 1,280-acre farm in 2007, West Central scientists and extension specialists have begun several research projects:

- Simon van Donk, irrigation/water resources specialist, and Aaron Stalker, range beef specialist, research corn stalk grazing that addresses how corn residue grazing and baling impact sustainability and profitability of crop and livestock producers.
- A variable rate irrigation study, led by Tim Shaver, nutrient management specialist, looks at how to use these systems across different soil types and elevation while managing nitrogen rates.
- A new project this spring will examine the value of manure as fertilizer. Shaver and others will incorporate remote sensing technologies to find out how much nitrogen is supplied to crops over time.
- Bob Klein, western Nebraska crops specialist, works on no-till production practices, winter wheat varieties and skip-row planting trials.

Brule lab


Tim Shaver

Student research


Nick Ward

Student research is a big part of the West Central Water Resources Field Laboratory near Brule. Nick Ward, an agronomy and horticulture graduate student from Wamego, Kan., is conducting his doctoral research at the lab.

Ward's research focuses on the management of nitrogen fertilizer and irrigation; specifically, how variable rate technologies for both fertilizer and irrigation can be used together.

He hopes to maximize efficiency of nitrogen and irrigation from both an economic and environmental standpoint.

The collaborative work involves faculty from agronomy and horticulture, biological systems engineering and USDA-ARS in Lincoln.

So far, the study has included treatments of three nitrogen rates — 0, 75 and 225 pounds per acre and three irrigation rates — full irrigation, 70 percent and 40 percent. Ward is working on data analysis from 2012, and plans to continue the same study in this year.

Klein's passion for water-saving work

From no-till farming to increasing herbicide efficiency, Bob Klein has centered his life's work around crop residue management and conserving water in a part of Nebraska where water typically is scarce.

Klein, western Nebraska crops specialist at the university's West Central Research and Extension Center at North Platte and a recent Omtvedt Innovation Award winner, has been with the university 52 years. He said with no-till systems weed control is critical, and is a reason he became involved with pesticide applications and related technology in the 1970s.

He has seen the value of crop residues many times over in west central Nebraska.

"They not only protect the soil from wind and water erosion, but also increase yields," Klein said.

Under Klein's wheat fallow management, two crops were planted in three years. In addition is his skip-row planting that leaves some rows of corn unplanted, such as planting two rows then skipping two rows. Skip-row can produce 40- to 60-bushel an acre corn when conventionally planted corn yields little or nothing.

Some of the most sustainable practices to conserve and manage residue have been through Klein's work, said Don Adams, West Central director.

Klein continues to work with and supports the team at the lab near Brule.

Stories by Sandi Alswager Karstens

- Researchers are collaborating on drought tolerant variety trials with several seed companies.
- Graduate student projects are under way and NCTA students are involved on the farm, which hosts UNL Extension field days throughout the year.

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Dana Adamy

Bob Klein

Grassing up

Institute of Agriculture and Natural Resources faculty are partners in a new regional project to determine how best to grow, manage and process perennial grasses, including switchgrass, into a biofuel.

Iowa State University is the lead university for the project, known as CenUSA Bioenergy, though IANR is involved in several facets of the work. This includes research into breeding and production/management, and extension and teaching efforts to share findings with producers and students.

About $1.9 million of the $25 million total is allocated to the University of Nebraska–Lincoln for the five-year grant, said Ken Vogel, a U.S. Department of Agriculture-Agricultural Research Service (ARS) geneticist based at IANR. An additional $2.5 million is funding the ARS breeding and management research at IANR. The management research is being led by Rob Mitchell, ARS agronomist.

Switchgrass and other perennials, including big bluestem and Indiangrass, are appealing biofuel sources because they can be grown on marginal land and, once established, are relatively low maintenance.

One thrust of this USDA-funded research is a conversion process, known as pyrolysis, that might be more economical than past techniques. Pyrolysis is the thermal decomposition of biomass in the absence of oxygen to produce an energy-rich liquid called bio-oil, which is essentially a bio-crude that can be converted into commercial liquid fuels; and biochar, a carbon-rich and nutrient-rich solid that can be used to improve soils. Bio-oil is of particular interest for developing fuels that can be converted to diesel fuel or jet fuel since ethanol cannot.

Vogel's focus is breeding switchgrass and other grasses, while other ARS and IANR scientists work on management, entomology and plant pathology research. Tiffany Heng-Moss is leading the entomology research while Gary Yuen is leading the plant disease research. Still others are developing teaching and extension modules to train students and producers who want to grow the crop. John Guretzky, an assistant professor in agronomy and horticulture, said he and colleagues at UNL and Purdue University will be producing modules on perennial grass growth, establishment, harvest management and storage during the grant.

Courtesy

Ken Vogel's switchgrass research could lead to new biofuels.

The UNL funding also is supporting on-farm demonstration trials led by UNL Extension educator Keith Glewen.

Ken Vogel, 402-472-1564, *ken.vogel@ars.usda.gov*

– Daniel R. Moser

More on YouTube

Switchgrass and other perennials, including big bluestem and Indiangrass, are appealing biofuel sources because they can be grown on marginal land and, once established, are relatively low maintenance.

Carbon in storage

Farm management practices affecting carbon storage in soil, a process known as carbon sequestration, continue to be studied by Institute of Agriculture and Natural Resources scientists.

The latest wrinkle in the decade-plus-long project, Second Generation Biofuels: Carbon Sequestration and Life Cycle Analysis, began in 2010. Continuous corn grown at two irrigated sites has identical management practices but for one difference: After fall harvest, stover remaining on one field could be baled and removed for processing for second-generation biofuels. Scientists are monitoring differences in carbon exchange, evapotranspiration, and fluxes of nitrous oxide and methane, said IANR's Andy Suyker.

Over the years, the rainfed corn-soybean rotation has remained carbon neutral. The irrigated corn-soybean rotation system was a moderate source of carbon early in the study but recently became neutral. Irrigated continuous corn was mostly carbon neutral for the first three years, then became a moderate source of carbon for three years, Suyker said. The reason may be a heavy layer of stover litter that accumulated, plus increasing insects and disease. Conservation tillage has restored it to a more carbon-neutral state.

Suyker said scientists from elsewhere are using IANR data, available at *Ameriflux.lbl.gov*, for their own research.

Increasing atmospheric concentrations of carbon dioxide, a greenhouse gas associated with climate change, are driving interest in storing more carbon in cropland.

– Daniel R. Moser

Andy Suyker

Special equipment measures carbon stored in soil.

Successful formula

A mix of food scientists, business consultants and pilot plants make the Food Processing Center (FPC) in the Institute of Agriculture and Natural Resources one of the nation's most comprehensive resources in food manufacturing, said Rolando Flores, center director.

"The center was among the first of its kind when it was established 30 years ago," Flores said. "We still support entrepreneurial activities and help people add value to food products."

Developing and marketing a safe food product isn't easy, Flores said, and FPC knowledge and resources save would-be entrepreneurs months — even years — of time and energy.

Big-name companies seek FPC expertise to develop products such as gluten-free dressings or noodles made from Nebraska's dry beans. FPC student employees gain valuable experience helping develop successful food products. Outstanding and unique microbiology and cereal testing laboratory services also are provided, Flores said.

In addition to help with grant writing, perfecting formulas, product and process development, labeling, marketing, sensory testing to gauge consumer attitudes, and more, since 2008 the FPC has offered sophisticated applied research, such as efficient byproducts use and safety from microbial contamination.

Last year the center's Dairy Store produced more than 18,600 pounds of cheese and nearly 14,000 gallons of ice cream. A new ice cream flavor — selected in a high school competition — will be featured at the center's 30th anniversary open house from 1-5 p.m. June 9. *More on FPC 30th*

Stories by Cheryl Alberts

The FPC offers:

- Food entrepreneur assistance
- Applied research and engineering
- Business development
- Laboratory services
- Pilot plant services
- Processing
- Product development

The Food Processing Center celebrates 30 years in 2013.

Nick Manes

Miranda Schurr

It's a wrap

A sandwich sealed Miranda Schurr's fate.

Schurr's Eustis-Farnam High School team placed fifth in the 2008 National FFA Food Science and Technology Career Development Event, generating a tasty turkey wrap, nutrition and calorie facts, and labels.

She chose food science and technology as a career, and working at the FPC is an excellent fit for the college junior.

"I get a lot of variation in this job and get to know the process. It's so much more than making the product," Schurr said.

"The process" may mean less salt, more tartness, all natural or flavored. Sometimes success comes with three tries, sometimes with 10. All steps are carefully documented.

Plus FPC food safety lessons are practical at home, Schurr said, adding, "It's almost everyday life kind of learning."

David J. Jisa

Christine Jisa

Cheese, this whey

Fluctuating milk prices drove David Jisa's value-added decision to make cheese, rather than sell milk.

For two years Jisa intensely researched the art of cheese making, and in a third year built Jisa's Farmstead Cheese near Brainard. He made his first batch in 2005.

"If it hadn't been for the university's Food Processing Center I'd have been dead in the water. It would have been impossible to get going," Jisa said. FPC employees past and current advised him on cheese making, as well as packaging, labeling, marketing and all else he needed.

"We still trade ideas," he said.

Jisa's 300 Holsteins supply the milk, made into cheese flavors such as spinach artichoke, smoked bacon, English cheddar and cranberry jack sold as far away as Kansas City and Chicago.

Connie Warnsing

Greg Leech

From fruit to nuts

Originating as Grandma's Fruitcake in 1965, in later decades Beatrice Bakery Co. changed hands several times.

When then-owner Sarah Lee planned to close it in 2001, local investors saved the company in 2002, said Beatrice Bakery CEO Greg Leech.

However, Leech said, "overnight, we went from our corporate office taking care of things to doing it all ourselves."

The Food Processing Center helped Beatrice Bakery work through nutrition and ingredient labeling, new product development, payroll and bookkeeping.

In 2008 an FPC undergraduate helped them perfect the formula for an amaretto peach hazelnut cake. Currently Beatrice Bakery is working with the FPC on a longer shelf life for a new bread.

The center is "very good to work with," Leech said.

Gary Goodding

Fast **Facts**

Clients served since 1983: **2,460**

Clients served in 2012: **152** (76 from Nebraska)

FPC employees:

19 full-time

39 undergraduates

8 graduate students

Dedicated in 1983 as an IANR, Nebraska Department of Economic Development and private sector collaboration to stimulate food manufacturing

Four modern pilot plants, three laboratories, confidential services tailored to each client's specific needs

Diverse Research in the

Photos by Dave Ostdiek

High Plains Ag Lab field day participants observe wheat trials.

For more than 40 years the goal of the High Plains Agricultural Lab (HPAL) near Sidney has been to improve dryland crop and livestock production profitability through applied research responsive to local needs.

The lab's diverse research reflects that, with a major focus exploring which alternative crops might thrive in the heart of a grasslands biome with a dry, mid-latitude climate, said Linda Boeckner, director of the Panhandle Research and Extension Center at Scottsbluff.

"This is the only full dryland research facility in the state, and it helps other areas of the world also trying to grow sustainable crops to meet world food needs," Boeckner said.

Of HPAL's 2,400 acres, one-third consists of dryland crop rotations with two-thirds pasture.

Fifty to 60 research trials are conducted annually by Institute of Agriculture and Natural Resources scientists based at the Panhandle, the University of Nebraska–Lincoln and neighboring states. Students also conduct graduate research and work at the lab.

Expertise at the lab encompasses agronomy, plant breeding, plant physiology, pathology, soil fertility, entomology, weed sciences, marketing, economics and livestock nutrition.

Without such research, Keith Rexroth of Sidney, chair of the HPAL Building Project Committee, said the future of production agriculture is "bleak and unknown. The process and work at this lab is our lifeline into the future ... The past and present High Plains Ag Lab research has opened doors into more effective crop production, alternative crops and more water-efficient crops."

Stories by Sandi Alswager Karstens

HPAL Programs

Proso Millet

The study of proso millet and fenugreek is conducted by Dipak Santra, alternative crops specialist. Santra is interested in crops that fit well with dryland cropping systems. Proso millet, typically sold in the United States as a birdseed, is used elsewhere in the world for human food consumption. Fenugreek is a semiarid crop mainly grown for its seeds.

Forage

Forage quality and yield of warm- and cool-season grasses are researched by Gary Hergert, soil and nutrient management specialist.

Cover crops

The study of cover crops, and how those might work in cattle diets and other alternative uses in cattle feeding, are conducted by Karla Jenkins, cow/calf specialist, who works with agronomy on this study.

Winter wheat

Winter wheat varieties are researched in conjunction with the work of small grains breeder Stephen Baenziger.

Entomology

Entomology work about wheat stem sawfly and other area pests is conducted by entomologist Jeff Bradshaw.

High Plains

New building to continue mission

Construction is set to begin this spring on a new 2,400- to 2,800-square-foot building at the High Plains Ag Lab.

The HPAL started on 2,410 acres that was part of the Sioux Army Ordnance Depot. In 1967 the federal government made the land available to the university. The building that came with the land was never meant to be a permanent headquarters, but became so throughout the years, said Linda Boeckner, director of the Panhandle Research and Extension Center.

"The new building will give better, more healthy office space for the staff, graduate students or visiting scientists," she said.

Fundraising is nearly complete for the $500,000 project.

The new building will include office space, a small laboratory and a facility to do more seed sorting and handling. It also will have a conference room that can accommodate 10 to 12 people and up-to-date office technology.

The old HPAL building soon will be replaced.

iStock

Real-time market action

Plans are under way for an agricultural economics commodities trading room, providing real-world experience under faculty direction and supervision.

Just as chemistry students have labs for conducting scientific experiments, a commodities trading room will allow ag economics students to analyze portfolios, develop and test trading strategies, and develop risk management strategies in a dynamic learning environment, said Larry Van Tassell, head of IANR's Department of Agricultural Economics.

Providing university students with a real-time commodities training market increasingly is becoming the norm nationwide, Van Tassell said.

The room will provide faculty and students a place to conduct research and, combined with courses in a new commodities trading option, give students advanced training in markets, merchandising, futures and options.


iStock

West to East

A presentation by a UNL Extension educator based in Sioux County on how grass grows caught the eye of an International Society for Range Management past president, who took the presentation with him to share with yak producers in Mongolia.

Mongolia's rangeland is similar to that of Sioux County; grass physiology and grazing principles are the same world round. Meanwhile, back in Sioux County, a group of a dozen range professionals meet monthly to further good range management practices in the area.

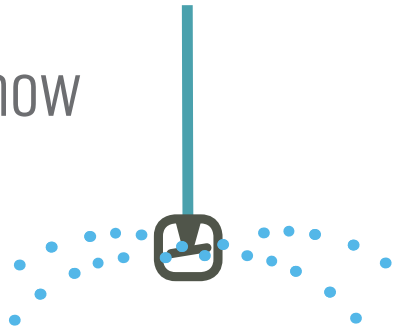

iStock

Youth science

High school sophomore participants of Youth Science Field Days learn about science, which can spark interest in science-related career options. Hands-on learning activities complement classroom learning relating to plants, animals, food science, wildlife, water, natural sciences, insects and human health.

The UNL Extension fall event, held in Holdrege, Kearney, Lexington and North Platte, attracted nearly 600 students last year. This fall the field day also will be held in Hastings. A spring field day focusing on animal science is held in Curtis.

Irrigation know-how



With more than 93,500 active irrigation wells in Nebraska, water management is important. IANR, in conjunction with all four of Nebraska's center pivot manufacturers, is collaborating on a second, three-year project to maximize benefits available in situations where water supplies are constrained. Both the first and second projects are funded by the Nebraska Environmental Trust and offer educational irrigation workshops.

A 2011 report on the first Center Pivot Water Use Conservation Project said participants reduced pumping by about 951,000 acre-inches, and saved $5.36 million annually. The second Conserving Water Through Informed Water Management project runs April 2011-April 2014. *More*

Wastewater treatment

Nearly 270 Nebraska onsite wastewater treatment professionals in 2012 learned about protecting water quality through improved practices as part of their continuing education requirements. Thanks to UNL Extension education, most wastewater professionals say they changed practices related to soil testing, onsite system design and onsite system installation. Classes, in partnership with the Nebraska Department of Environmental Quality and the Nebraska Onsite Waste Water Association, are held each fall in communities such as North Platte, Grand Island, Mead and Norfolk.

More

Money camps

Money doesn't grow on trees, and thanks to financial literacy programs from UNL Extension, youth in central and eastern Nebraska now are more aware of money and spending decisions.

In 2011-2012, UNL Extension camps, school enrichment and after-school programs helped 563 youth understand basic money management and develop sound financial habits for life. Student evaluations at the end of the program show 95 percent of students understood the difference between needs and wants, with 85 percent saving their money. More than half said they would create a spending plan — and would spend less.

Green infrastructure

David Shelton

You won't find conventional storm drains on a new street in the city of Wayne's industrial park. Curbs and gutters are gone, too, part of a new green infrastructure for stormwater management and a more sustainable landscape approach.

Wayne municipal officials used information provided by UNL Extension, through a grant from the National Institute of Food and Agriculture, to choose bioswales to help filter and direct street runoff water rather than more traditional designs.

Bioswales and other green infrastructure practices were estimated to save the city approximately $250,000 in construction costs on three different projects, as well as reducing water runoff and associated pollutants.
More

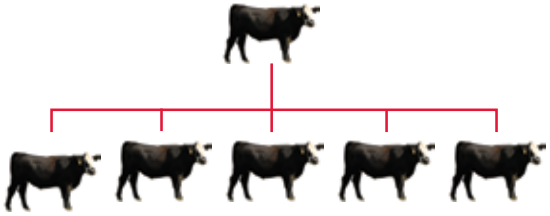
Ranching for Profitability

Whether much-needed rainfall occurs in 2013 or not, UNL Extension range and beef experts share tips on important ranching decisions for pastures, grazing and herd management.

Ranching for Profitability's eight workshops in 2013 reached 312 producers, bankers, veterinarians, agribusinesses and nutritionists from central and western Nebraska. These producers represent more than 887,750 beef animals and more than 788,500 acres. More than 75 percent of those surveyed in 2012 said they would likely make changes such as early calf weaning and purchasing alternative feed resources. *More*

RentWise

Finding and keeping decent housing can be a challenge. UNL Extension's RentWise program, offered through the Nebraska Housing Developers Association, helps participants learn such things as money management, how to take care of a home and what to do when moving out. RentWise also teaches how to develop positive relationships with landlords and neighbors. Available in English and Spanish, RentWise helps tenants renting for the first time and helps others avoid rental problems they had in the past. *More*



DNA advancements

Rapid advancements continue in the genetic selection of beef cattle using DNA technology. In each of the last two years, more than 100 participants attended a UNL Extension DNA meeting at Clay Center. They gained knowledge in genomics and the impact on the accuracy of expected progeny differences, as well as using genomics to select commercial heifers, the relationship among beef breeds and more. Participants influence decisions on more than 117,000 head of beef cattle annually. The 2013 meeting is scheduled for June 26 at the U.S. Meat Animal Research Center at Clay Center. *More*

Water Academy

Nebraskans can broaden their knowledge about water, related natural resources and leadership through the Water Leaders Academy, a partnership of UNL Extension, the Nebraska State Irrigation Association and others. The goal of the yearlong academy is for participants to learn more about water science and politics to make informed, cooperative decisions.

Six meetings are held annually throughout the state, with tours and knowledgeable speakers further informing mid-career professionals. The 2011-2012 classes had 26 graduates, while 2013's class has 12 participants. They include farmers, attorneys, business people and people involved with recreation and environmental sciences.
More

Up on the rooftop

Nebraska's state grass could be rising to new heights.

Little bluestem *(Schzachyrium scoparium)*, along with other tough native Nebraska grasses, are top contenders for topping off green roofs, said Richard Sutton, who teaches horticulture and landscape architecture at the University of Nebraska–Lincoln.

"Green roofs have been around for ages," Sutton said, citing pioneer sod houses. His five-year study with undergraduate research students and four Lincoln collaborators details the how-tos and costs of seeding native grasses onto rooftops, and provides insights for the green roof course he teaches.

"Green roofs represent a man-made ecosystem," Sutton said, noting on a 105 degree day last year he found a giant praying mantis on the green roof of the Arbor Day Foundation in Lincoln. It had retreated from rooftop sedum into its cooler native grass.

Green roofs could attract other beneficial insects such as wild bees, whose annual pollination value is worth millions of dollars, he said.

Stormwater control is a key green roof advantage, slowing runoff through its medium of heat-expanded lightweight shale, sand and compost, he said.

Acting as a giant sponge, the green roof absorbs water until saturated, then slowly releases overflow. This lessens the load on storm sewers, reducing flooding.

The Institute of Agriculture and Natural Resources professor hopes more green roofs are considered for new construction. His study covered plant species, season, spacing, biomass, maintenance and cost. He calculates labor and native grass seed to plant a 1,000-square-foot rooftop 6 inches deep runs 79 cents per square foot.

That compares to $5 per square foot to plant sedum, a flowering exotic most often used for green roofs.

Richard Sutton

Larsen Building – Parkhaus, 2012

Sandhills Publishing, 2011

Arbor Day Foundation, 2010

Pioneers Park Nature Center, 2007

Green roof cooperators in Lincoln, year participation began

By complementing sedum with native little bluestem, blue or hairy grama, sand dropseed or dryland sedges, Sutton said green roofs can better withstand heat, drought and wind, with little or no water and fertilizer.

Grass roofs do need mowing — but only once a year.

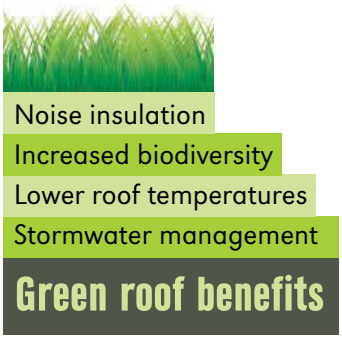
Richard Sutton, 402-472-1127, *rsutton1@unl.edu*

– Cheryl Alberts

More on green roofs

Nick Manes

Professor Richard Sutton with Salvador Lindquist, landscape architecture senior from Lincoln.



Supporting NU

Agriculture Builders of Nebraska (ABN) got its start in supporting the creation of the Institute of Agriculture and Natural Resources in the 1970s. It has evolved into a key partner and supporter of the entire University of Nebraska system.

ABN's 190 members come from the entire gamut of agriculture and agribusiness. They include farmers, ranchers, small business people, bankers and more.

Al Svajgr of Cozad, a cattle feeder, farmer and rancher who also has some banking interests, is the current president. Svajgr said the group looks for members who have shown leadership in agriculture-related fields.

"We're people who truly have a passion for agriculture, the Institute, CASNR (College of Agricultural Sciences and Natural Resources) and research and extension," he said.

Alan Moeller, IANR assistant vice chancellor, said there's not another group quite like ABN in the country. They're conservative-minded, but "they understand that you have to invest in education and research."

ABN also has evolved from its original goal of supporting IANR to supporting the entire university. NU President James B. Milliken and Ronnie Green, NU vice president and IANR Harlan vice chancellor, say that ABN is one of the most effective lay organizations that supports the university, as well as the best agricultural support group in the country, bar none.

Alan Moeller, 402-472-2871, *amoeller1@unl.edu*

– Daniel R. Moser

Jake Olson ©

The future of rural

College students will go into rural communities to help with leadership and entrepreneurship projects and mentor troubled juveniles in youth rehab centers; faculty will help communities convince University of Nebraska graduates to return to their communities to work and live.

Those are some of the 11 projects funded in the first round of Rural Futures Institute (RFI) grants for research, teaching and engagement. More than $750,000 in grants was awarded.

RFI also is in the midst of searching for its first permanent director and planning its second Rural Futures Conference, set for Nov. 3-5 in Lincoln.

Mark Gustafson, RFI interim director, said, "The first Rural Futures Conference last year really helped set the agenda for the institute, and we expect the hiring of a director, the awarding of these grants and our second conference in the fall to really move us forward."

What's key about RFI, Gustafson said, is that it involves all four NU campuses — faculty and students — working with community leaders to help strengthen rural Nebraska.

"We've asked faculty to come up with creative new opportunities to engage with rural communities," Gustafson said. While the grants are awarded to NU faculty, he emphasized that RFI wants communities and nonprofit organizations with bold, creative ideas to bring those forward to the institute.

The institute was established to build partnerships between the university and rural communities in an effort to help rural areas be resilient, sustainable and innovative.

More on Rural Futures

– Daniel R. Moser

Targeting rural mental health

An IANR partnership with several rural communities is helping address a lack of mental health services.

Under one initiative, UNL experts are helping several communities address targeted needs. St. Paul and Albion are participants, and Loup City has just signed on, said Richard Bischoff, professor and chair of the Department of Child, Youth and Family Studies.

A team in Albion identified a need for marriage-strengthening programming and convinced the local theater to air a Sunday afternoon marriage-enrichment film that drew 50 couples. A month later a speaker on the topic drew 140 people.

UNL's role is to help assess the effectiveness of communities' efforts, including a new anti-bullying initiative under way in Albion that will result in a student-led camp later this year. St. Paul is doing monthly educational events on different topics.

"Rural communities are really resource scarce" in mental health services, Bischoff said. "Without putting any additional resources in Albion and St. Paul, they're making headway in providing mental health services."

Richard Bischoff, 402-472-5801, *rbischoff2@unl.edu*

– Daniel R. Moser

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Integrating Latinos

Latino immigrants to rural Nebraska are a vast pool of largely untapped human and social capital, but most move on to larger cities in search of better opportunities for themselves and their children.

If rural communities could figure out how to retain these hard-working immigrants, they could help revitalize these areas, said Rochelle Dalla, a UNL associate professor in Child, Youth and Family Studies who spent a decade researching this issue in several Nebraska meat-processing communities.

First-generation immigrants often arrive in these towns with little education or knowledge of English, but as they better themselves, "they outgrow these communities, so to speak," Dalla said. Then they look to move to larger cities, particularly for the sake of their children. The constant turnover that ensues in rural towns makes it hard for Latinos to truly integrate, or for longtime residents to accept them.

Encouraging Latinos to become entrepreneurs might be one solution. Schools already have played an important role by bringing children together and will continue to be key. "We're all invested in our children. We all care about our children and love them."

Rochelle Dalla, 402-472-6546, *rdalla1@unl.edu*

– Daniel R. Moser

Reining in business sense

iStock

Rodeo is a business, not a charity. That's what UNL Rodeo Club Coach Mark "Bump" Kraeger tries to instill in the minds of club members. The goal is to sell sponsorships, not ask for donations.

Kraeger has been a volunteer rodeo club coach for the last four years and a member himself in the late '80s and early '90s. He knows the business aspect of the sport very well.

"A big part of my college education is what I learned in rodeo club — raising money to do things we wanted to do," he said.

Kraeger said the self-supporting University of Nebraska–Lincoln student club gives its 70 members pride and a sense of the business world.

Kraeger and his wife, Leesa, have three sons. The eldest, Hoyt, is an animal science sophomore in the College of Agricultural Sciences and Natural Resources, and a club member.

Visit casnr.unl.edu/rodeo

Nick Manes

Mark "Bump" Kraeger

"That is another driver now," Kraeger said. "I want my boys to get the same benefits from the program that I got."

In the last year, Kraeger said club members have worked on a new sponsorship structure. Webcasting *(spurradio.com)* the annual April rodeo at the Lancaster Event Center in Lincoln has expanded the reach. In 2012, 2,500 people from around the globe logged on to watch the rodeo. This is in addition to the nearly 1,000 people who filled the rodeo stands to capacity for each of five performances, he said.

"Sponsors need to know how many people will see their banner or hear their name announced. It's all about publicity," he said.

The animal science graduate said the club has had some rocky financial years, but it now may have one of the largest student-operated budgets on campus.

"The Lancaster Event Center working with us is huge. We also have great support from CASNR," he said.

Kraeger said while he and other volunteer advisers/coaches Jamie Baumann and Travis Marshall offer a lot of advice, the students do the work and it is their leadership that has made the club successful.

When Kraeger isn't busy with the rodeo club, he is a technology developer for a small bio-energy company.

– Sandi Alswager Karstens

Courtesy MT Photography

A growing college

As a graduate of the College of Agricultural Sciences and Natural Resources, I am thrilled to see the consistent growth the college has experienced over the past eight years. The job market demands this type of growth, and I am excited to see what opportunities await our current students.

Much of CASNR's growth can be credited to individuals like you who share the college's story with your children, neighbors and others you encounter. You also create internship and full-time job opportunities for our students, and for that we say thank you.

To show our appreciation for all you do, we are hosting regional alumni gatherings, with the most recent held in North Platte and Grand Island. They were a great time of networking with alumni and supporters of the college, and we are looking to continue these events throughout the state. If you are interested in co-hosting one of these events with the CASNR Dean's office, please contact Jill Brown at *jbrown14@unl.edu* or 402-472-3224.

We are also gearing up for another season of football tailgates. Our CASNR Alumni Association tailgate will be on Sept. 21 (South Dakota State) four hours prior to kickoff in the Nebraska East Union. All alumni and supporters of CASNR are welcome to attend. Football tickets will also be available for purchase for those with membership in the University of Nebraska–Lincoln Alumni Association. If you are interested in obtaining tickets for the CASNR Alumni tailgate and/or the actual football game, please contact Jill Brown.

Courtesy

Alumni and supporters are also welcome to attend the Institute of Agriculture and Natural Resources tailgates. Those tailgates will be held in the Nebraska East Union four hours prior to kickoff on Oct. 5 (Illinois) and Nov. 16 (Michigan State).

All tailgates include free shuttle service to the stadium.

We hope to see you at one of our upcoming events in 2013!

Travis Edeal
CASNR Alumni Association President

See CASNR YouTube

Meet five faculty members

new to the Institute of Agriculture and Natural Resources in the past two years.

Their expertise ranges from agricultural economics to limnology.

Each was asked to answer the following two questions:

What brought you to UNL?
What do you hope to accomplish for Nebraska and for advances in your field?

Amy Burgin, assistant professor of environmental sciences, joined IANR's School of Natural Resources (SNR) in 2011. She teaches limnology, the study of inland waters. Her research integrates the fields of microbial ecology, biogeochemistry and aquatic ecosystem ecology.

Why UNL: Nebraska is a good place for my research on how agricultural landscapes affect aquatic ecosystems — and has no shortage of either! I am thrilled to be a part of the SNR.

Accomplish/advances: My major goal is to integrate understanding of aquatic ecosystem functions into an agricultural landscape for effective land management. Also, my work will look at how wetlands affect carbon storage and greenhouse gas production, and/or how streams draining into ag lands process and transport nitrogen.

Samodha C. Fernando, assistant professor, joined the Department of Animal Science in 2011. His research focuses on understanding microbial structure-function relationships to improve human and animal nutrition.

Why UNL: The combination of strong undergraduate and graduate programs, unique facilities, the Gut Function Initiative, all attracted me to UNL as a wonderful place to pursue my interests in gut microbial ecology and function.

Accomplish/advances: My interests are in translational research, using basic science that has potential to help Nebraska producers. My goal is to establish a nationally recognized research program in gut microbial ecology with emphasis on livestock.

Kathleen (Kate) Brooks, extension livestock economics specialist and researcher, joined IANR in 2013.

Why UNL: Nebraska is one of the top livestock producing states in the nation, making it a great place to conduct research and extension activities on livestock marketing and risk management. This, tied with my background in livestock production economics and livestock marketing, makes UNL a great fit.

Accomplish/advances: The livestock and agricultural industries are undergoing many changes. My work in livestock marketing and risk management will support livestock producers and stakeholders throughout Nebraska, helping them make management and marketing decisions as changes continue.

Amy Schmidt, assistant professor and extension specialist, joined the Department of Biological Systems Engineering in 2012. Her focus is livestock manure management with an emphasis in protecting water quality. Her spouse is UNL animal scientist Ty Schmidt.

Why UNL: I wanted to be in a place having a strong agricultural industry, and Nebraska is a great fit. Farmers work hard to produce safe food while minimizing environmental risk; my goal is to help them continue doing so by working with colleagues to develop tools and economical practices to manage manure and nutrients.

Accomplish/advances: My work relates to manure nutrients and pathogens, alternative manure management practices and manure treatment technologies. All are to help producers and stakeholders improve practices, and make decisions that positively impact the environment.

Fabio Mattos, assistant professor and researcher, agricultural economics marketing and risk management of grains, joined IANR in 2013.

Why UNL: This is a great opportunity to work with world-class professors, researchers and students in a big, renowned university, especially in a state that has such a strong and active agricultural industry.

Accomplish/advances: Commodity markets have been through many changes in recent years. With my research and teaching I want to develop new instruments and provide new insights to improve our understanding of how those changes affect risk management and marketing regionally and nationally.

New NCTA dean

Ronald Rosati has been selected as the new dean of the Nebraska College of Technical Agriculture starting in July.

Since 2010 Rosati has been provost of Southeast Missouri State University. Previously he served in a number of roles at Texas A&M University-Kingsville, including dean of the College of Agriculture, Natural Resources and Human Sciences.

His background is in agricultural education, with bachelor's and master's degrees from Cornell University and his doctorate from Iowa State University.

Weldon Sleight, the previous NCTA dean, retired last year.

IANR's impact

reaches across the state and around the world. Here is just a sample of IANR's impact by the numbers.

21,693 students have graduated from CASNR

and its predecessors, according to alumni records dating to 1876; 276 students are expected to graduate from the college in May 2013.

114 native Nebraska plants are grown by the Nebraska State Arboretum for its annual spring plant sales for Mother's Day, Wildflower Week and weekly Friday afternoon sales in May.

85 pieces of fire equipment were placed in Nebraska communities by the Nebraska Forest Service in 2012. The repurposed federal military vehicles in Nebraska have a replacement value of $45 million.

Nebraska Agricultural Water Management Network participants, representing 1.3 million crop acres, annually reduce irrigation water withdrawal by about 227,000 acre-feet.

62 IANR faculty members research water-related issues.

104 **The number of years the West Central Research and Extension Center has served the state.** The Panhandle center has been open for nearly as long, 103 years. The Northeast center has been in operation for 55 years, the Southeast for 45.

1,104 poinsettias were grown by the UNL Horticulture Club as part of its fall 2012 fundraising, supporting educational trips, speakers and other club programming.

92 percent of 4-H members who graduated from high school in 2012 are pursuing a post-secondary education.

15%

of total energy consumed in the U.S. in the early 2000s was used by various combined stages of the food system, from production to distribution, an IANR study shows.

More than **20,000** unit books have been sold as part of UNL Extension's **EntrepreneurShip Investigation** (ESI) youth entrepreneurship training curriculum.

1,103

students are **enrolled in online distance courses** through CASNR. Students represent **41 states** and **nine countries,** and choose from **46 undergraduate** and **45 graduate** courses.

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Mailing panel