2023 ANNUAL REPORT

INNOVATIVE AGRICULTURE

SERVING KANSAS AND THE WORLD

Kansas State University | College of Agriculture

K-State Research and Extension

INVESTING TO ADDRESS

The Opportunities and Challenges Facing Agriculture

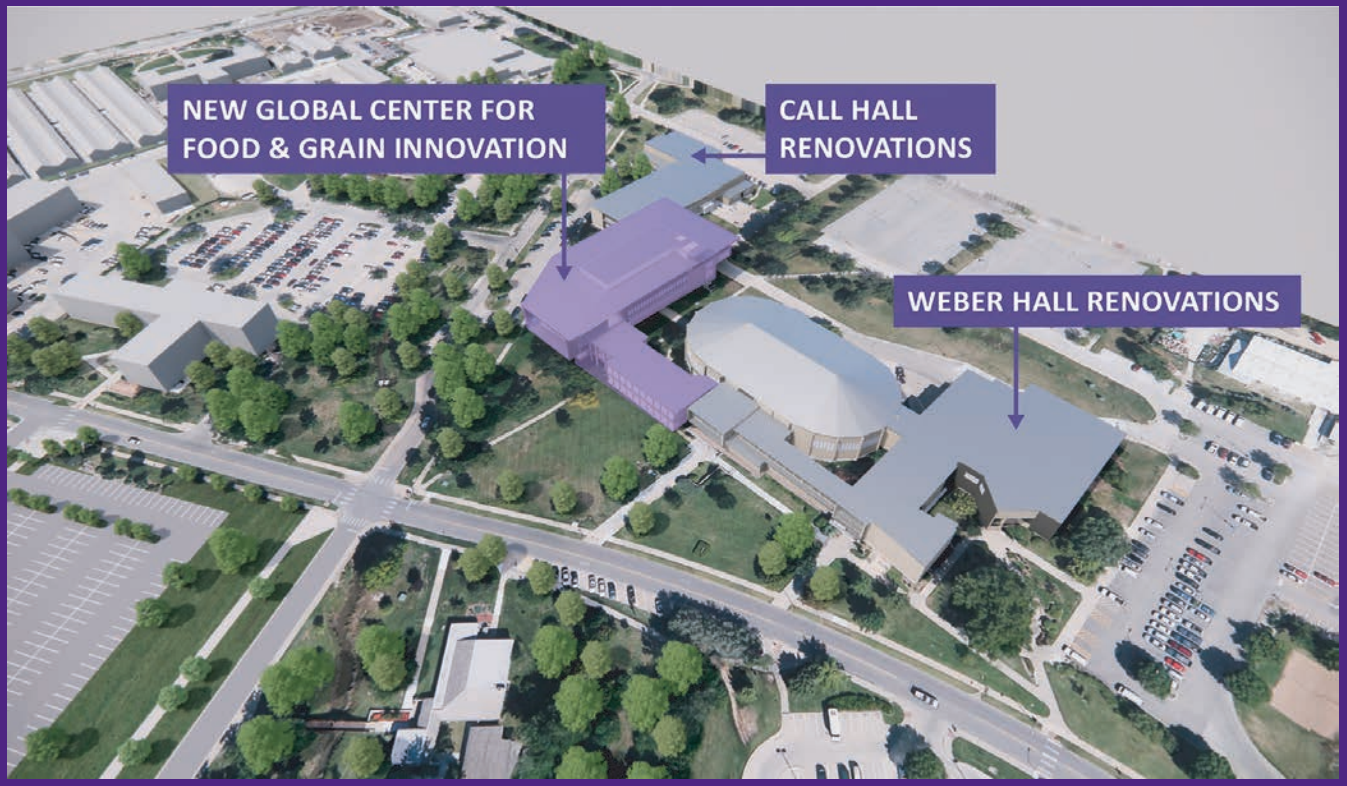
We plan to soon break ground for the Global Center for Food and Grain Innovation, the Agronomy Research and Innovation Centers, the Livestock Competition Arena, and the Horse Teaching and Research Unit. These new and renovated facilities will be equipped with the latest research technology and provide space for collaboration and interdisciplinary teaching and research.

The complex opportunities and challenges facing agriculture today cannot be addressed within a single academic or research area or with 20-year-old technology. It will take the best minds across many disciplines in academics, industry and government-sponsored agencies working together and with the tools they need to do the job.

Funding for these buildings will come from state and private support. In 2022, lawmakers granted K-State $25M to help fund construction and renovations for these buildings, and they challenged us to raise private funds offering a three-to-one match through the University Challenge Grants. With the support of alumni, friends and industry partners, the college raised in excess of $75M in five months. At this time, the $25M request is under consideration by the Department of Commerce, which is administrating the program.

NEW INNOVATION CENTERS

Dedicated to Ag Teaching, Research and Innovation



These interdisciplinary teaching and research centers will be created within the corridor of Call and Weber halls. The work within will focus on accelerating grain, food, animal sciences and agriculture systems innovation and teaching.

This facility will replace the existing Farm Research Center and provide modern facilities for collaborative research to support the development of agronomy and agricultural systems. It will serve as the new public face and front door to the Agronomy North Farm.

This project includes a new multi-species, 3,000-seat competition arena and K-State Horse Teaching and Research Unit, a modern equine breeding and training facility equipped to support the expanding educational opportunities for undergraduate, graduate and veterinary medicine students at K-State.

A BETTER K-STATE, A BETTER KANSAS

Agriculture is the largest economic driver in the state generating $76 billion each year and supporting more than 256,000 jobs or about 14% of the state's workforce.

K-State agricultural teaching, research and extension support for Kansas agriculture is a sound investment: every dollar spent yields a $17 return to the economy.

With the opportunities these buildings offer that return rate will only increase. The collaborative work within these centers will expand our next-generation research and attract larger, multi-disciplinary grants. The centers will help us recruit top faculty and attract and graduate more students in agriculture to meet the growing demand for a skilled workforce. A recent Kansas Department of Agriculture survey found a third of employers representing ag-related companies expect to add more full-time jobs.

Equipped with the latest technology and staffed with top K-State scientists, the centers will also advance agriculture on an international scale while providing the research needed by producers, businesses and industries within the United States.

GROWING THE ECONOMY – COMMUNITY BY COMMUNITY

K-State Research and Extension's revitalization efforts improve lives while paving the way for new businesses and industries to make their home in Kansas. Examples of K-State Research and Extension's work include:

Grant-Writing Workshops: Specialist Nancy Daniels' grant-writing workshops and one-on-one counseling have netted more than $38M between 2017 and 2021 to groups across the state working to improve their communities. Participants include Nancy Issac, who received $306K from the grant she wrote to build the 20-mile Western Sky Trail joining Wilson and Neosho counties with walking, running, biking and horseback riding trails. These trails will encourage healthier lifestyles, while also attracting people and businesses to the area. An economic impact study found that two similar trails in Kansas together contributed $1.85M in 2021 for their communities.

First Friday e-Calls: K-State Research and Extension hosts a monthly online series that began in 2016 to support community development. Kansas citizens and community leaders join the discussion each month to look for opportunities and possible partnerships on everything including revitalization efforts, housing, broadband and funding opportunities. As an example, during December's call a representative from the Kansas Department of Commerce announced the agency has $1.5M allocated in 2023 to help the state's smaller cities and towns restore aging downtown areas, and described how to apply. The series is gaining a growing following. In 2022, the average number of monthly viewers was 136 – 40% more than the year before.

Responding to Childcare Needs: An independent economic impact study found the number one obstacle communities faced in improving economic prosperity was a lack of childcare. The study found that Wichita County was short 84 slots for children five and under, and projected 67 adults would join the workforce if they were able to place their children in quality care. Adding those 67 people to the workforce would add an additional $1.8M in annual personal income in the county. Wichita County Agent Aimee Baker helped coordinate a five-year community effort to open the $1.2M Grow & Learn Childcare Center in Leoti, giving more parents the opportunity to work without the disruption caused when good and regular childcare is unavailable. The center opened on Nov. 1.

Community vitality is attracting new business and industry to the state. In two years, eight food- and agriculture-related companies have announced plans or opened their doors. Together, they represent $2.8 billion in new investments and nearly 2,000 new jobs for Kansas.

Amber Wave, a plant-based ethanol and protein production company, in Phillipsburg, is bringing 60 new jobs and a $250M investment.

Barlett, a soybean-crushing facility in Cherryvale, represents a $325 million investment bringing 50 new jobs to the area.

Hilmar Cheese is opening a new cheese and whey processing plant in Dodge City that will bring 750 new jobs and a $600 million investment.

Hills Pet Nutrition's new wet food plant in Tonganoxie will bring 80 new jobs and a $250 million investment to Kansas.

JTM Foods is breaking ground in Wichita for a manufacturing facility to make JJ's Snack Pies. It is a $40 million investment that will bring 150 new jobs.

Scorpion Biological Services plans to build a new biodefense and biomanufacturing facility in Manhattan that represents a $650M investment and 500 new jobs.

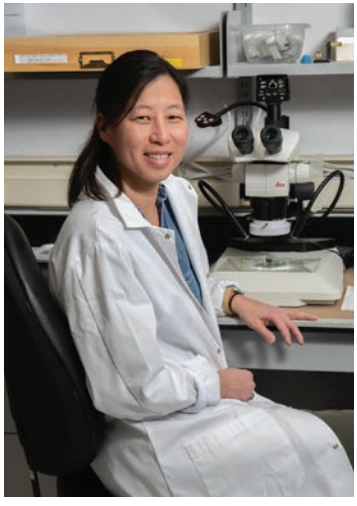
Schwan's announced plans to invest $600M to build a new distribution facility in Salina that will provide 225 new jobs.

Simmons Pet Food is investing $115M in a new distribution center in Edgerton that will bring 177 new jobs.

REGENERATIVE AGRICULTURE

Many K-State scientists are identifying regenerative farming as the long-term solution for some of the most difficult issues facing agriculture. Based on ecological principles that encourage farmers and ranchers to work with nature rather than against it, regenerative agriculture is more than a sustainable practice. Instead, it focuses on change related mainly to correcting soil degradation and making that soil richer and healthier. Regenerative practices include the use of cover crops, no-till planting, integrating livestock into crop management practices, reducing the use of pesticides and synthetic fertilizers, and adapting farming practices based on current changes in the climate and environment.

Kraig Roozeboom, Ph.D.



Tania Kim, Ph.D.

Logan Thompson, Ph.D.

Peter Tomlinson, Ph.D.

Cover Crop & No-Till

Kraig Roozeboom, *Ph.D., Professor, Agronomy*

Kraig Roozeboom grew up on a diversified crop and livestock farm where he learned the value of conservation and stewardship of natural resources from his father, who was an early adopter of no-till crop production and had installed terraces throughout his rolling farm land to prevent soil erosion.

That philosophy steered Roozeboom toward a career focused on discovering how to better steward our soils. He said, much of what he learned comes down to two words: "intensify and diversify." Roozeboom and his team found that by intensifying the cropping system with cover crops and double-cropping using diverse crop species increases organic soil carbon near the surface, potentially leading to such benefits as better soil structure and water infiltration.

Roozeboom said he can't make general statements about which cover crops or crop sequences fit best in Kansas, because the soil, water and temperature vary so much across the state. But a consistent focus on protecting the soil in the local context is an important long-term investment for any producer.

"We remember the Dust Bowl and the destruction it caused," Roozeboom said. "Some may wonder about the cost, particularly of planting cover crops, which provide erosion and weed control and lessen soil compaction. What we have learned is that **you can grow cover crops throughout central and eastern Kansas with either neutral or positive benefits on cash-crop yields if managed appropriately. Short-term returns can be realized through grazing, and the long-term benefits to the soil are substantial.**"

Pest Control

Tania Kim, *Ph.D., Assistant Professor, Entomology*

Tania Kim and her team are approaching pest and weed control in a more ecologically friendly way. They are studying how beneficial insect species move from their nearby natural habitats into agricultural fields. **The presence of these "good" insects among crops reduce the need for pesticides and other weed-control efforts.**

The natural habitats Kim and her students study can run along the edge of a field, in long strips between sections of crops or in place of cover crops.

Designed to attract beneficial insects, like ground and lady beetles and pollinators, the habitats are planted with native, perennial prairie species, like stiff-stemmed grasses, wildflowers and milkweed. The ground beetle is especially valued for eating both the insects harmful to crops and the seeds of weeds.

"Our research shows that placing natural habitats close to agricultural fields significantly increases the number of these good insects in adjacent crop fields," said Kim. "It can be an effective, affordable and environmentally beneficial conservation practice."

Prairie Strip *photo courtesy of NRCS/SWCS by Lynn Betts*

Regenerative Grazing

Logan Thompson, *Ph.D., Assistant Professor, Animal Science and Industry*

Logan Thompson is moving a national study into Kansas that he believes will lead to a better understanding and practice of regenerative grazing and the benefits it offers to improve soil health and sequestering carbon into the soil.

Regenerative grazing involves carefully controlling the number of livestock and the amount of time they feed in a particular pasture or paddock at one time. Typically, this involves animals staying closer together, with the farmers and ranchers focusing on the amount of time their livestock graze in a particular area to ensure the vegetation is maintained or improved. It's a practice that some say mimics the patterns of wild migrating herds.

This type of grazing can improve the condition of the soil, and carbon can be sequestered because the land is always kept covered and the roots and soil microbiome are fed and left undisturbed.

Rather than providing set instructions or protocols for farmers or ranchers interested in regenerative grazing, Thompson said he and other researchers are focused on helping producers recognize when they need to move their herd to avoid over-grazing and the detrimental impacts this can have on the health of the grass and rangelands.

Supporting Sorghum, a Climate-Smart Commodity

Peter Tomlinson, *Ph.D., Associate Professor, Agronomy*

K-State scientists have received a $1.6M grant to modernize recommendations for applying nitrogen fertilizer to sorghum to boost the value of this grain that has a long history of being grown successfully in some of the world's most severe environments.

According to Peter Tomlinson, the K-State project lead, the new recommendations will be developed to help farmers apply nitrogen in proper amounts to maximize yields while avoiding over-application, which could ultimately seep into the groundwater or contribute to global warming.

Tomlinson said the grant is part of a five-year, $65M award to the National Sorghum Producers through the U.S. Department of Agriculture's Partnerships for Climate Smart Commodities project.

When the grant was announced in mid-September, **Tim Lust, National Sorghum Producers CEO, called it a "watershed day for the sorghum industry … providing the opportunity to realize sorghum's potential as a climate-smart commodity."**

Tomlinson said that K-State's research for this project will be conducted in three locations across the state: Manhattan, Hays and Colby.

Commitment to Academic Excellence

Academic year 2022

97%
JOB PLACEMENT RATE

12:1
STUDENT TO FACULTY RATIO

50+
AG-SPECIFIC CLUBS AND COMPETITION TEAMS

One of the nation's

TOP RANKED
AG SCHOOLS

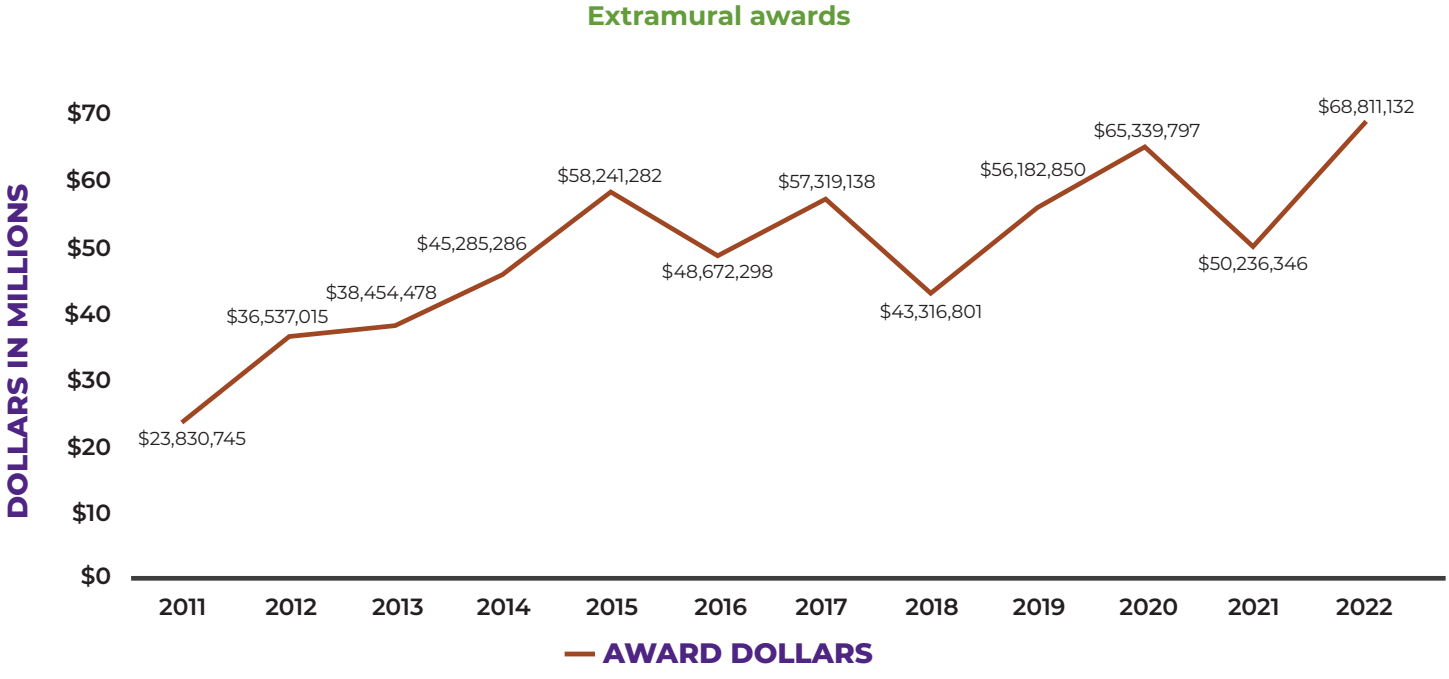
$2.3 MILLION
COLLEGE-SPONSORED SCHOLARSHIPS AND FINANCIAL AID

699
DEGREES CONFERRED

16
MAJORS AND 16 MINORS

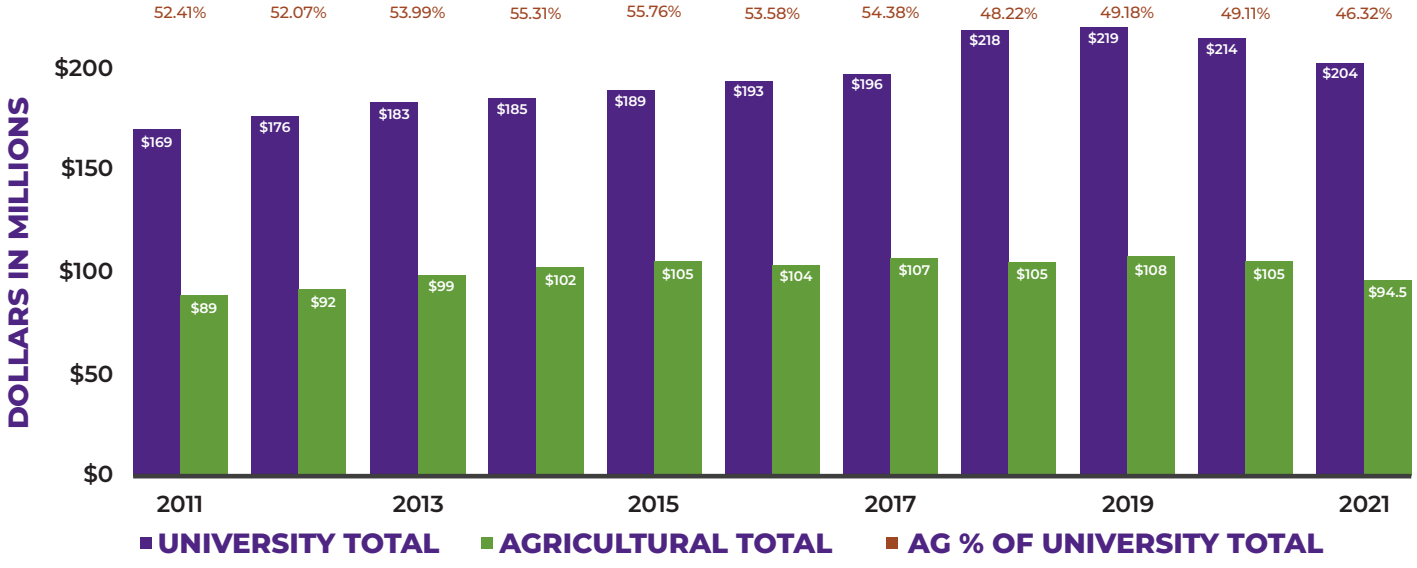
EXCELLENCE IN RESEARCH

Extramural funding is the money that is awarded from outside the University and used to support a program or project. It typically comes from federal, state or local governments; businesses; private foundations; or individuals.



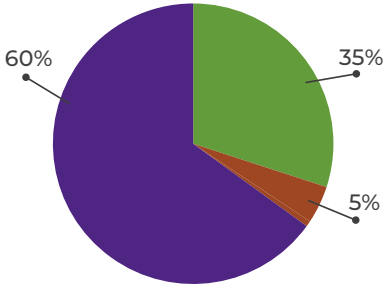
Research expenditures

Research expenditures are the funds spent to conduct research. The term refers to the nationally accepted method to measure research activities, since it showcases the amount of work that is accomplished and the impact to the economy when research funds are spent during a specific time period.



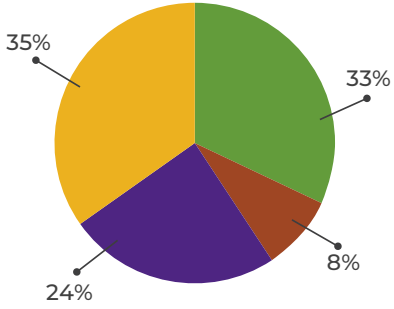
OUR FUNDING SOURCES
Fiscal Year 2023

Agricultural Experiment Station



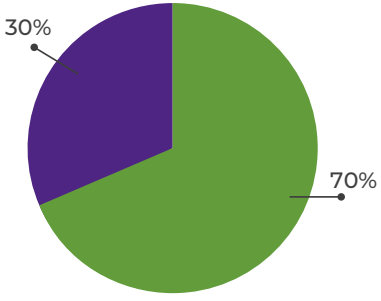
- Grants, Contracts, Other Funds $57,233,593
- State Appropriation $33,067,481
- Federal Appropriation $4,500,000

Cooperative Extension



- County/District Appropriation $22,000,000
- State Appropriation $21,226,117
- Grants, Contracts, Other Funds $15,008,765
- Federal Appropriation $5,400,000

College of Agriculture



- State Appropriations and Tuition $12,183,347
- Grants, Contracts, Other Funds $5,155,748

SHARED COMMITMENT IS KEY TO OUR FUTURE

Everyone at the College of Agriculture and K-State Research and Extension is grateful for the ongoing support we receive from the state – particularly the dollars allocated for faculty and staff raises and the funding support for our new innovation and research centers. Both enhance the university's ability to focus on continual improvement and economic development. We can hire and retain the best and brightest minds, and with the new infrastructure project, significantly diversify and increase our research and teaching capabilities to attract students from both Kansas and around the world.

The focus on funding education and innovation across the state is improving lives and recharging and redefining the Kansas economy. And, this is just the beginning.

We thank you for your help and look forward to new opportunities to work together.

J. Ernest Minton

J. ERNEST MINTON, PH.D.
Dean, College of Agriculture
Director, K-State Research and Extension

KANSAS STATE UNIVERSITY

College of Agriculture

AG.K-STATE.EDU

K-STATE Research and Extension

KSRE.K-STATE.EDU

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

RPT108 | January 2023