



BUILDING A FUTURE PILLAR 3

ECONOMIC PROSPERITY

KANSAS STATE
UNIVERSITY

VISION

Kansas State University is the world's foremost global food and biosecurity science university. Nowhere else in the world has the talent and specialized assets to successfully solve problems such as food contamination and climate impacts across the entire food and agriculture chain, including production, processing, packaging, distribution and food safety at all stages — a unique innovation ecosystem.

K-State is the only university in the world with bio-safety level-3 and biosafety level-3 agriculture laboratories located on campus, as well as a biosafety level-4 animal laboratory at the National Bio and Agro-defense Facility, known as NBAF, directly adjacent to campus. These high-containment research facilities provide scientists a secure location to study high-consequence pathogens affecting plants, animals and human health. These and other unique facilities at K-State create an environment focused on delivering innovations to improve global health, trade and security through partnerships with academic units on campus and industry.

K-State will aggressively leverage its global preeminence to advance the university's land-grant mission and create novel pipelines of new direct jobs and direct investments coming into the state. K-State has a long history of supporting economic growth in the state and has made a public commitment to advancing these efforts. In 2017, the Association of Public and Land-Grant Universities recognized these efforts by designating K-State an [Innovation and Economic Prosperity institution](#).

The university's Pillar 3 economic prosperity initiative is built upon the four foundational focus areas of global leadership:

- Food and Agriculture Systems Innovation.
- Digital Agriculture and Advanced Analytics.
- Biosecurity and Biodefense.
- K-State 105.

INTEGRATED GOAL AREAS OF K-STATE PILLAR FOUNDATIONS

Value-driven innovation: Improve profitability, productivity and resiliency through value-driven innovation. K-State and its partners will be at the forefront of sustainable agriculture system innovation including economic viability, environmental protection, zoonotic disease surveillance and management and social equity.

Responsive knowledge: Train and develop an adaptive agricultural and biosecurity workforce to meet the societal demands and business needs to protect food and agriculture systems. The generation and delivery of new knowledge will facilitate decisions informed by science to mitigate challenges and provide solutions.

Holistic solutions: Deliver profitable business solutions generated from interdependent food supply chain and agriculture systems. These solutions will be measured by the well-being of people and animals, the effect on the environment, reduction of risk and the use of new processes and technologies needed to attract investments and create jobs.

ALIGNMENT

State, national and global public and private sector stakeholders have expressed alignment with these goals, signaling marketplace need and relevance, through their strategic funding initiatives and priorities, outreach, listening tours and other assessments:

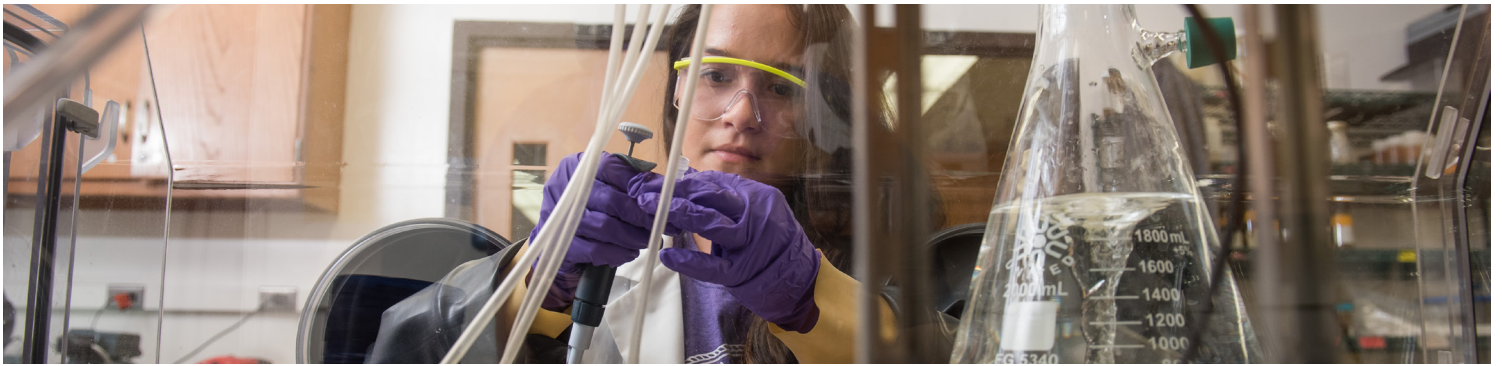
State

Forty-two percent of the state economy is tied to [agriculture](#). Value-added items are critical for the marketing of [Kansas products](#). The beef cattle ranching and farming sector is the top employer in Kansas with the [highest financial output](#). Lack of workforce development is a statewide barrier to future [rural prosperity](#). Kansas must continue to build private-public partnerships to protect and conserve the state's water supply and be good stewards of the land — embracing environmental, economic and social sustainability.

National and global

National [agricultural science](#) and [innovation goals](#) will advance the U.S. food and agriculture system to be more productive, efficient, resilient and sustainable through new approaches, partners and strategies. K-State's goals directly align with those of the National Academy of Sciences' stated needs for [agricultural sustainability](#) and [innovative breakthroughs](#). High-priority indicators for the U.S. [Roundtable for Sustainable Beef](#) include water resources, land resources, air and greenhouse gas emissions, efficiency and yield, animal and plant health and well-being, and employee safety and well-being.

Extreme weather events dominate the [five most likely long-term risks](#) among the [World Economic Forum](#) community. Feeding people, feeding animals and reducing food surplus are the top three components of the [Food Recovery Hierarchy](#) to implement sustainable food management and address the fact that 31% of the [U.S. food supply is wasted](#). There is international agreement that massive interdisciplinary collaboration is required to unlock the full potential of [Artificial Intelligence](#), or AI.



PATHS TO SUCCESS

- Growth of the university research enterprise.
- Development of strategic corporate partnerships.
- Engagement with global industries and government agencies.
- Advancement of existing Kansas net-importer-of-dollars businesses.
- Attraction of mature companies.
- Development of emerging companies.
- Creation and incubation of new businesses.

FOCUS AREAS

The four foundational focus areas of K-State's plan for economic prosperity are:

- Food and Agriculture Systems Innovation.
- Digital Agriculture and Advanced Analytics.
- Biosecurity and Biodefense.
- K-State 105.

These focus areas leverage existing K-State strengths that match state economic needs and global opportunity for prosperity building.





FOOD AND AGRICULTURE SYSTEMS INNOVATION

CONCEPT

The Food and Agriculture Systems Innovation focus area will identify and implement strategies resulting in transformed, sustainable and adaptable food and agriculture systems that will create jobs in Kansas and solicit direct capital investment into the state. These strategies will result in innovations such as development of nontraditional grains — such as durum — and water-conserving crop solutions — such as cotton and sorghum — that stimulate value-added opportunities critical to economic development in Kansas. Kansas' food and agriculture systems will be in alignment with the changing values and needs of consumers and other food and agriculture system stakeholders, creating a sustainable competitive advantage for Kansas with the following five- to ten-year outcomes including:

1. Stimulating economic growth and job creation.
2. Establishing profitable, regenerative and sustainable food and agriculture systems.
3. Fostering disruptive technology and innovation.
4. Improving Kansas community health through nutritional security.

Kansas will emerge as a food, feed and fiber systems leader in the nation and Kansas' presence will be felt in the households and hands of consumers across the U.S. and world.

ALIGNMENT

Kansas is a recognized producer of food and feed crops and beef cattle. These staples of the Kansas economy have evolved into value-added opportunities involving primary processing, manufacturing, distribution and services. Kansas' growing food processing industry is an indicator of the growth potential within our state. As evidenced by numerous stakeholders, our vision, goals, strategies and outcomes respond to marketplace need and relevance.

State

The [Kansas Framework for Growth](#) focuses on five tradable industries. Kansas is twice as specialized than the national average in one of these industries, food and agriculture. The Framework for Growth specifically calls out leading higher education institutions specialized in food and agriculture to utilize extension systems and research facilities to make Kansas "a world-class home to research, development, and testing of new technologies in animal health, crop science, ag-tech and data analytics." This proposal directly responds to all four Kansas Framework for Growth strategic pillars — talent, innovation, community assets and policy — and how the shared strategies are seeking value-added opportunities, ag tech innovation, sustainability initiatives, and the targeted support of producers.

National and global

The United States Department of Agriculture, or USDA, Agriculture Innovation Agenda's goal is to increase ag production by 40% while also cutting agriculture's environmental footprint in half by 2050. Similar goals for sustainable and regenerative food and agriculture systems are outlined in the newly released 2021 report, [The Challenge of Feeding the World Sustainably](#).

DIFFERENTIATION

This focus area will be led by a steering committee tasked by the Vice President for Research to leverage existing resources and strengths of K-State, partner institutions and industry collaborators. New scalable multidisciplinary links across the university will enable systems-level food and agriculture research that will catapult innovations, solicit direct capital investment and provide a well-trained food

and agriculture workforce to support growing Kansas job opportunities. K-State has extensive expertise in individual food and agriculture systems components, however, due to the resources and coordination involved, large-scale food and ag systems transdisciplinary efforts have not been possible. The central direction will help to integrate K-State's expertise across campus and the state to catalyze scientific discovery and innovation in new ways.

Food and Ag System Components	Food and Agriculture Systems Components K-State Expertise and Facilities Innovation Potential
Consumers and Stakeholders	Expertise: Consumer behavior ag communications, nutrition, logistics Facilities: Centers and service units Innovation potential: Consumer data-driven production decisions, communication of science-based knowledge to consumers
Production	Expertise: Crop and livestock production including genetics, precision ag; pest management; food feed safety, soil health, water quality and conservation, Facilities: Statewide research centers and livestock and crop production facilities Innovation potential: Smart and regenerative agriculture technologies, strategies and practices
Primary Processing	Expertise: Grain, milling, food, feed and meat science and safety, supply chain and traceability Facilities: the Hall Ross Flour Mill, O.H. Kruse Feed Technology Innovation Center, Biosecurity Research Institute (BRI), Bulk Solids Innovation Center Innovation potential: Milling and extrusion technologies; improved produce, food and feed safety
Manufacturing	Expertise: Food science and safety; value-added product testing and development Facilities: BRI, Kansas Value Added Foods Lab (KVAFL), Feed Technology Innovation Center, Bioprocessing and Industrial Value-added Products Innovation Center Innovation potential: Processing speed, yield; transportation/distribution; functional foods and value-added products; diversity and product utility food safety and nutrition
Marketplace	Expertise: Agricultural economics; food/feed safety and quality, human nutrition Innovation potential: Increase food/feed and food/feed ingredient traceability; reduce food waste and improve food accessibility through improved logistics
Consumer	Expertise: Nutrition, food safety, outreach and extension, ag communications Facilities: Kansas Value Added Foods Lab, K-State Meat Cookery/Sensory Lab Innovation potential: Food safety and individualized nutrition information, technologies and outreach, consumer preferences



Food and Agriculture System Strategy and Implementation

K-State's food and agriculture stakeholder-driven systems-level strategy will integrate all system components in recognition of the interconnectedness of the components within a given system. This comprehensive approach demands a transdisciplinary team of researchers and educators across K-State colleges, as well as other Kansas institutions to comprise the required agricultural and other physical, biological, social science, engineering and extension expertise. A directed and comprehensive stakeholder outreach effort and regular engagement with an advisory board to identify systems that are ripe for advancement, optimization and have economic potential in the state will be key to K-State's success in achieving the four outcomes.

This strategy will align with and contribute to state, national and global private-sector investment interest and economic development goals and opportunities. The steering committee will leverage, build upon and ensure alignment, but not duplicate other multidisciplinary institutes and initiatives — such as other Pillar 3 focus areas and K-State's Food Science Institute and Global Food Systems Initiative. Particular attention will be made to aligning with [state priorities](#) for alternative crop development and value-added opportunities and ag tech innovation and applications.

An advisory board for the Food and Agriculture Systems focus area will be established to inform goals and activities and to provide input on progress and impacts. The advisory board will include members representing the state — including departments of agriculture and commerce and

KBOR — and a diverse group of producers, processors, industries and community leaders.

Partners across food and agriculture systems are integral to the development of sustainable and regenerative food and agricultural systems. Examples of key focus area partners include:

- Ag machinery and technology manufacturers.
- Equipment design.
- Dairy production and processing industries.
- Small grains and specialty crops production, handling and supply chain.
- Regional philanthropic foundations — Kansas Masonic Foundation, Dane Hansen Foundation.
- Educational sector — K-14, regional and peer teaching and research universities.
- Value-added processing —including food, specialty crop and pet food.
- Livestock industry — Livestock grazers, finishers, meat processing and packing.
- Small business incubators and cooperative extension community development teams.
- Other research institutions — Kansas, U.S. and world.
- Commodity and trade organizations — Kansas Commodity Associations and Commissions.
- Federal and state government — USDA, KDA.

Additional partners may include the Kansas Health Foundation, investment and financial industries, small businesses and development institutions — Chambers of Commerce, Kauffman Foundation, NetWork Kansas, KS Small Business Development Center; Urban agriculture industry —vegetable production, vertical farming;

Water disinfection technology companies; and Regional economic development organizations — Kansas City Area Development Council, Flint Hills Regional Council, etc.

The steering committee will be instrumental in working with partners, stakeholders and subject matter experts at K-State and partner institutions to identify necessary expertise, infrastructure, and other resources required for K-State's systems-level approach and will lead efforts in conjunction with the Office of Research Development to find ways to leverage and fund institute work from state, federal and other sources to fill critical resource gaps.

Specific systems-level strategies will be determined by a transdisciplinary team that will be informed of the gaps, needs and opportunities within a given system by food and agriculture system stakeholders. Below are examples of high-level strategies needed to achieve each of the four outcomes:

Outcome 1: Stimulate economic growth and job creation

User-informed strategies that deliver profitable and practical business solutions for each portion of the food and agriculture system will attract investments leading to new job opportunities for Kansas graduates. High quality formal and continuing education will address critical workforce gaps, increasing both the number of trained professionals and students seeking an agricultural science and systems education.

Outcome 2: Establish profitable, regenerative, and sustainable food and agriculture systems

K-State will identify practices and technologies that go beyond sustaining Kansas food and agriculture systems to meet challenges and opportunities in alignment with the other three K-State Pillar 3 focus areas. Targeted strategies will restore and improve natural resources while striving to meet [national goals](#) of increasing agriculture productivity by 40% and cutting agriculture's environmental footprint in half by 2050. The resulting practices and technologies will improve plant and animal health through reduction of diseases and pests, food and feed safety and nutrition,

soil health, water and air quality, water availability and biodiversity under climate change and other emerging system challenges. Knowledge gained will inform state economic development policies and incentive programs, state regulations and other and state policies.

Outcome 3: Foster disruptive technology and innovation

A key role of this Food and Agricultural Systems Innovation focus area will be to generate knowledge integral to shaping new technologies critical to the Digital Agriculture focus area. Experience working with transdisciplinary teams, educational degree programs and industry specific workforce training will contribute to a digitally competent workforce required to fill Kansas jobs created through systems innovation.

Outcome 4: Improve Kansas community health through nutritional security

Strategies will be designed to identify practices and approaches to improve nutritional security for Kansans and provide a roadmap for the nation in close collaboration with the other K-State Pillar 3 focus areas. The USDA defines nutritional security as, "when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life." Kansas food systems will deliver consumer-informed and nutritious food options, provide significant contributions to innovations that broaden and strengthen traditional and alternative protein production, advance precision nutrition, enhance nutrient diversity, and contribute needed practical solutions to reducing food waste and loss in alignment with the recent [USDA dietary guidelines](#) and [national research efforts](#) in precision nutrition.

Potential Transformative Food and Agriculture System Opportunities for Kansas

In addition to the specific strategies stated above for each outcome, the following are brief and specific examples of livestock and crop systems where the state of Kansas has potential to improve or develop.

Non-traditional grains and water conserving crops: The agroecosystem of Kansas is driven by a small number of large acre crops: wheat, corn, soybean and sorghum. However, diversification and development of value-add are critical to economic development. Linking affordable feedstocks to the livestock industry and developing new niche markets is tantamount to success. There are several crops that hold promise including cotton, hemp, durum and high value niche market crops such as sorghum, millet, ancient grains such as spelt, farro, quinoa and buckwheat; triticale; pulse crops like chickpea, field pea, dry bean and specialty crops, tomato, cucumbers, potatoes, tree fruits, green vegetables.

Beef cattle: As the top employer in the state with the highest financial output, the beef cattle sector is critical for the Kansas economy. To sustain this competitive advantage and to meet future challenges, innovation across the beef cattle system is necessary. Building capacity to test new innovations is an opportunity for transformation that combines K-State expertise with the strategies outlined in this document. Management techniques, new digital technologies being pioneered at K-State and other innovations that improve beef cattle productivity while improving sustainability are potential new innovations.

Capacity building will require developing experts within the industry's segments including seedstock, cow-calf, stocker, feedlot, slaughter, and other expertise necessary to stimulate sustainable investment and job creation. Transformative opportunities include, but are not limited to, precision livestock management in the cow-calf sector, supply chain sustainability in the stocker sector and feeding, environmental and supporting infrastructures in the feedlot sector.

GAPS AND NEEDS

An exhaustive listing of all the talent, facilities, and other financial needs cannot be created until after the systems to be addressed are identified. While K-State has expertise in many areas of food and agriculture systems, additional knowledge may be needed to adequately address stakeholder goals in a reasonable amount of time.

Research talent to be attracted in disciplines critical to achieving strategies:

- Food and ag system transportation, product distribution, and traceability.
- Consumer behavior and trends indicative of future market needs; holistic systems ag economics.
- Crop genetics, genomics and pest management and animal production.
- Food processing and manufacturing.
- Climate adaptation and resiliency.
- Food waste and loss.
- Sustainable small grains and food product development.
- Research/development facility update and replacement:
- Replace outdated facilities , add new as needed and address renovation/major maintenance issues in other facilities.
 - » Phases 1-3 of the College of Agriculture and K-State Research and Extension Master Plan.
 - Phase 1: New building that will increase collaboration across the food, animal and grain science areas while also providing pilot-scale food processing capability.
 - » The Human Dimensions Learning Laboratory:
 - Specialized research focused on human and behavioral dimensions of agriculture, food and natural resources.

Staffing to manage/advance the focus area initiative:

- Support staff.
- Extension specialists working across the food system.
- Postdoctoral researchers, graduate/undergraduate staff.

Curriculum development/implementation:

- Updating current courses and developing new courses.
- Graduate and undergraduate certificates aligned with existing Global Food Systems Leadership Program.



Implementation phasing and milestones

Implementation Phase	Milestones
Phase 1	<ul style="list-style-type: none">Establish the Food and Agriculture Systems Steering Committee.
Phase 2	<ul style="list-style-type: none">Collect and analyze stakeholder input on Kansas food, feed and fiber systems opportunities and strategies — engage a broad stakeholder base, identify and stand up advisory board.Select systems to be addressed.Identify the transdisciplinary team.Determine integrated strategies for addressing stakeholder needs and advancing Kansas systems.Identify and pursue direct investment opportunities provided by federal and other sources, including aligned industry partners.
Phase 3	<ul style="list-style-type: none">Execute stakeholder-informed strategies.Develop and conduct workforce training, develop curricula, identify educational needs.Integrate data into devising practical and new or modifying current solutions, training, practices and communication.Deliver science-based, practical technologies and practices.Conduct continual evaluation of progress, impacts and meeting stakeholder needs.



DIGITAL AGRICULTURE AND ADVANCED ANALYTICS

CONCEPT

The state of Kansas is uniquely positioned to become the global hub for the development and deployment of digital agriculture and advanced analytic, or DAAA, systems. Today's largely reactive approach to food production and management is incapable of feeding the soaring global population. The leaders of tomorrow will empower global food system producers to move from eminence-based to evidence-based farming that is driven by data, analytics and decision making in near real time. Fluctuations in natural phenomena, evolving consumer preference, market implications of political decisions and countless other production and market variables often overwhelm producers' ability to react. Resultant unpredictable and severe production and commercial shocks diminish commercial profitability, consumer confidence and ultimately public health and safety. Core advancements transforming agriculture from reactive to a trans-disciplinary, predictive, solutions-based system are vital to make better-informed, more responsive decisions.

K-State's historical strengths across agricultural research — from biophysical to social sciences — are complemented by growing leadership in advanced analytics. Four technical approaches, which ambitiously build on K-State strengths to bring the K-State-Kansas agricultural system to the forefront of the fourth industrial revolution, will be developed as integrated, trans-disciplinary initiatives:

- Artificial intelligence for production agriculture.
- Scale-independent precision agriculture, current and emerging threats to crops, and precision livestock production.
- Leading an initiative in DAAA will further fuel growth of existing and attraction of new Kansas businesses and family sustaining jobs, and advance Kansas beyond its current national rank as a Top 15 technology state.

ALIGNMENT

K-State leads a wide range of DAAA-related research, teaching and extension initiatives, across colleges and with myriad state, national and international public and private partnerships. This includes:

- Computational infrastructure that encompasses AI, machine learning and a bioinformatics center.
- An advanced plan for an AI Institute on Production Agriculture
- Research on sensors, remote sensing and crop and livestock modeling.
- Advanced breeding platforms for crops and livestock.
- Internationally leading crop and livestock biosecurity research facilities.
- Strong presence and trust in all 105 counties in Kansas to help guide, pilot and scale relevant DAAA interventions.

K-State research, extension, teaching expertise and partnerships are at the center of the global livestock, animal health, grain and companion-animal nutrition corridors. This provides an unparalleled opportunity to anchor Kansas as a DAAA hub to drive expanded investment in technology and workforce development and facilitate agricultural business growth aligned with the private sector's customer base at a local, national and global scale.

State

Gov. Kelly's Ag Summit produced the Kansas Ag Growth Strategy, informed by more than 400 stakeholders including K-State. The strategy articulates priorities and opportunities across 19 sectors. All priorities and opportunities require DAAA to drive ag-led economic development in Kansas through 2030 and beyond.

National

The U.S. National Academy of Sciences, or NAS, recently published, "Science Breakthroughs to Advance Food and Agricultural Research by 2030," informed by input of hundreds of experts, as well as federal agencies and federal and private funders. The report elevates DAAA-related areas as key priorities to make U.S. agriculture more efficient, resilient and sustainable. The U.S. Department of Agriculture's Innovation Agenda and Science Blueprint expanded on the NAS report, aligning with its DAAA-associated priorities.

Global

K-State is the leader of a diverse range of global partnerships, including research at four Feed the Future Innovation Labs — more than any other university— and the Global Food Systems initiative. These multinational, private sector partnerships allow K-State and the broader innovation ecosystem to create the partnership network to provide the Kansas agricultural community with more globally linked information on pests, disease and other constraints, as well as trade, partnership and other demand opportunities.



DIFFERENTIATION

The goals of this proposal represent the next frontier in agriculture. K-State already has expertise, infrastructure and initiatives, however, the major leaps in research and development are ambitious and will take intensified, transdisciplinary work to realize. This initiative meets the NAS Science Breakthroughs call, allowing K-State and the state of Kansas to leverage strengths to battle the once-in-a-century shock to society and the global food system posed by the pandemic.

Stakeholder engagement rooted in the K-State 105 initiative will provide relevance and access to the university and our private sector partners' DAAA endeavors. Stakeholders have encouraged K-State to enhance its role in providing field experience to graduates.

By attracting data scientists with a program in DAAA at K-State, we are seeking to bridge the gap between the keyboard and the farmer's field. As the global agricultural landscape continues to shift, K-State must stand ready to provide awareness and facilitate adoption of new technologies, techniques and consumer-driven market demands. Advancements that are far reaching — yet require incremental changes in approach and application — have been expertly developed, evaluated and deployed by K-State and K-State Research and Extension over the history of the university.

Tomorrow's innovations will move the global food system into new production paradigms. Some of these technologies, even full segments of these agricultural markets, could be lost by the state if Kansas farmers, ranchers and manufacturers are not made aware of innovations and given time and support to adopt or adapt to them. As an example, recent innovations in cellular cultured meat products and the production of egg and bovine milk proteins through fermentation processes could alter the poultry, dairy, and meat processing industries

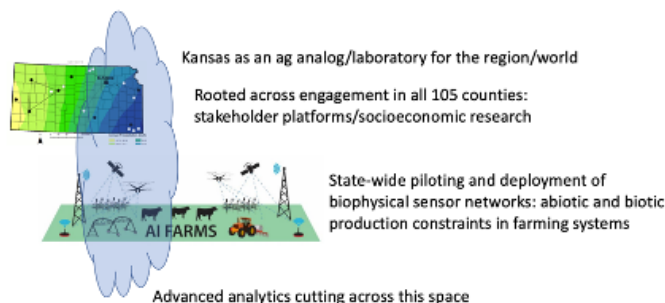
dramatically. These technologies will not produce substitute products, such as the more commonly known plant-based "meat" and "milk" products currently available for purchase, but they will in fact create a product identical to that which consumers have been eating for years, just without animal intermediaries. Kansas will need to be ready to evaluate the currents of change — relative to both innovation and consumer demand — and adjust course as needed to keep our economy viable and vibrant.

As the center of a vibrant ruminant grassland ecosystem, where better than Kansas to develop innovations for increased sustainability? Ruminant animals are crucial to the global protein supply because they convert human-indigestible plant cellulose into high-value food products. Beef cattle production and processing represents about two-thirds of the value of agricultural products sold in the state. Additionally, Kansas dairy production ranks 16th nationally and continues to grow, especially in western Kansas. However, current beef finishing and dairy production systems are vulnerable to disruption as weather variability increases, irrigation water becomes scarcer and consumers' preference for carbon neutral protein sources grows. In its Framework for Growth, the Kansas Department of Commerce noted that it will be important for Kansas to continue to diversify its agricultural economy, especially in the context of beef production, to anticipate changes in demand and consumer preference for beef from sustainable production systems. Considering this, K-State should conduct transformational research at the interface of grasslands, harvested forages, grain crops and livestock. The university must leverage current expertise and acquire additional faculty assets to lead interdisciplinary investigations that bring together breeding for climate resilient crops and precision breeding of livestock, including understanding of the rumen microbiome.

“There are significant failures in large biotech and agronomy companies when their Ph.D.-level data scientists have very little to no practical field experience in agriculture. This creates substantial blind spots in their work that could likely have been avoided with an element of hands-on work in the field.” — Kansas farmer who runs an ag tech sensor company

STRATEGIES AND IMPLEMENTATION

K-State DAAA Technical Strategy for Accelerating Innovation
The DAAA initiative will leverage Kansas' strengths into the smart farming laboratory of tomorrow. This initiative will transform the state into a premier next-generation research, development and commercialization hub, driving tradeable revenues into the state and increasing attractiveness for anchor programs.



Associated Phase 1 Strategic Activities

Enhancing current capabilities: Leverage existing computing capacity and AI research — including AI-driven data management, AI data analytics, cyber-physical AI and cybersecurity — and incorporate existing expertise in advanced breeding techniques and integrated cropping systems research to better attract opportunities and establish strategies that grow the capabilities and capacity needed to firmly establish K-State as a global leader in DAAA.

Leveraging geographic advantage: Kansas is uniquely positioned to serve as a DAAA development hub. The extreme variability of climatic and production conditions positions the state as an analog for a significant portion of U.S. and global dryland and irrigated agricultural regions. K-State's distribution of regional research and extension centers span this climatic gradient, making it an ideal laboratory for developing DAAA in the most variable and challenging environments. Additionally, K-State owns or leases nearly 30,000 acres of land throughout the state, which includes the [Lonsinger Sustainability Farm](#), dedicated to DAAA to inform sustainable, resilient, climate-smart crop and livestock research and development.

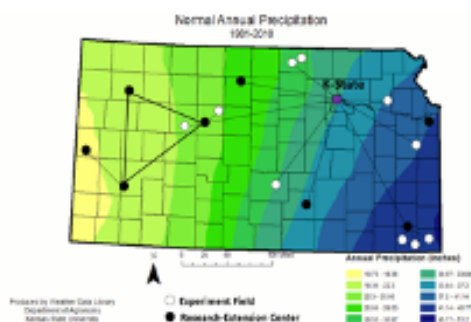
Increasing institutional coordination: Collaboration with other Regents' institutions in areas such as geographic information systems and remote sensing with the University of Kansas, and robotics with Wichita State University will be imperative to maximizing economic impact of DAAA research, teaching and training activities.

Associated Phase 2 Strategic Activities

Transdisciplinary integration: Core discipline unification will leverage K-State's DAAA strengths into global prominence. K-State's strengths in agriculture-related biophysical and social sciences provide the ideal foundation for predictive data-driven agricultural advancements that can only occur through elevation and fostering of engagement beyond core disciplines under a unified purpose.

Hardware and software development: Lead the development of new sensors and other point-of-decision crop and livestock tools. This includes the ability to innovate in portable computing processing efficiency, enhanced battery and power delivery systems, software development and integration and the adaptation of existing equipment to provide for fully integrated systems.

Informed workforce development: K-State will play a vital role in helping to identify and communicate the future private-sector demands and needs required of the digital agriculture workforce to better inform the state's educational system. This includes working closely with other state-supported organizations that are developing programming to enhance K-12 STEM education to produce a computationally literate workforce.



GAPS AND NEEDS

Core talent procurement: Additional globally recognized talent in key faculty hires and expansion of capacity in areas such as sensor technology, AI and machine learning will be required to fully exploit the relevant DAAA areas of opportunity.

Redefining data collection: Given the volume of data needed for DAAA solutions to be truly transformative, development of new methods for data collection, management and use and leveraging transdisciplinary expertise will be required to achieve our goals.

Shared facilities: As we attract more talent and funding in DAAA, additional infrastructure to house coordinated activities will be necessary.

BIOSECURITY AND BIODEFENSE

CONCEPT

K-State aspires to become the preeminent institution to advance discovery and development of biosecurity and biodefense strategies. We are the only university in the world with access to a full continuum of BSL 1-4 facilities located on or adjacent to campus.

While extensive, K-State's biocontainment capacity for intellectual discovery at these facilities is not sufficient to advance economic development. The proposed strategy will increase capacity for commercialization and manufacturing to ensure technological advancements are utilized in practical application. This structure will streamline the discovery to commercialization process for industry partners by reducing the regulatory burden associated with conducting containment/non-containment and live animal/benchtop research at multiple institutions. The extensive talent and infrastructure in Manhattan will attract companies, entrepreneurs and venture capitalists to the region. New technology will be developed for economically important plant, animal and zoonotic infectious diseases. No other university will have comparable assets.

During the COVID-19 pandemic K-State has been in a unique position to pivot research and contribute solutions for global human health using existing resources. The BRI was instrumental in securing for K-State \$12 million in funded grants as well as several license agreements related to COVID-19. The notable limitation was the capacity for commercialization at this facility. The proposed strategies will allow K-State to become the foremost U.S. resource to facilitate private-public collaboration for research on pathogens of worldwide significance. These assets will strengthen relationships with industry and increase access to export markets for food and agricultural products. K-State's collective expertise in vaccine development, regulatory affairs and flexible manufacturing capacity will not exist anywhere else in the world. A global reputation for success in discovery and commercialization will enhance our opportunities to attract corporate pharmaceutical partners, licensing agreements, and workforce talent.





ALIGNMENT

This goal supports the resilience of the agriculture sector and solidifies our status as a global leader and innovator, which is consistent with Kansas' Framework for Growth.

Beef cattle:

- Kansas ranks third in beef production nationally, with 6.45 million cattle on ranches and feed yards.
- Kansas cattle represent more than 50% of agricultural revenue, generating \$8.39 billion.
- Kansas also ranks third in exported beef at \$1 billion.
- Beef cattle farming and ranching has a direct output of about \$6.3 billion and employs more than 34,000 Kansans.
- Meat processing has a direct output of \$11.2 billion and supports more than 17,000 jobs.

In 2001, the United Kingdom depopulated 6 million cattle on 120,300 premises at a cost of \$6.9 billion due to a foot and mouth disease, or FMD, outbreak. Trade did not stabilize in the United Kingdom for 18 months after the outbreak subsided. An FMD outbreak in Kansas would be more devastating to the region due to the direct impact of restrictions on interstate movement of livestock to feedlots and processing facilities.

Swine:

- Kansas ranks 10th in swine production nationally, with 1,000 swine operations, 3.7 million market hogs, feeder pigs and seedstock sold annually, with an approximate gross market value of \$495 million.
- Kansas swine produced more than 600 million pounds of pork helping to feed millions of people in the U.S. and abroad.
- Kansas pork farms will spend more than \$90 million on grain sorghum and corn and \$64 million on soybean products this year.

In 2018, African swine fever virus, or ASFV, erupted in China and spread across Asia, killing more than 6.8 million hogs to date. The outbreak is uncontrolled and there is no effective vaccine.

A similar ASFV outbreak in the U.S. would devastate the swine industry. K-State faculty have signed licensing agreements for candidate ASFV vaccines and mitigation strategies in the last year, based on work performed in the BRI.

NBAF: The U.S. Department of Agriculture's NBAF, adjacent to the K-State Manhattan campus and BRI, will be the first facility in the U.S. to provide BSL-4 laboratories capable of housing cattle and other livestock. The facility will also feature a Biotechnology Development Module, or BDM, for pilot development and manufacture of vaccines and other countermeasures. The NBAF BDM will allow companies to accelerate technology transfer and large-scale manufacturing. This new capacity for innovation to prevent emerging zoonotic diseases will be unparalleled.

BRI: K-State faculty have the expertise and experience to commercialize research discovery with select agent pathogens due to access to the BRI, unlike typical select agent research that is limited to federally regulated, high-containment facilities. Few non-federal facilities qualify for permission to work with the range of pathogens approved for the BRI. ASFV and SARS-CoV-2 are just two examples of economically relevant diseases currently studied in the BRI. License agreements for intellectual property developed by K-State faculty in the BRI for both pathogens were signed in fiscal year 2020. Two important plant pathogens currently under study are *Rathayibacter toxicus*, or annual ryegrass toxicity, and *Magnaporthe oryzae*, or rice blast.

DIFFERENTIATION

With globally unique biosecurity and biodefense facilities and capabilities, further differentiation will be achieved by developing facilities to support pilot manufacturing, commercialization and workforce development across an all-inclusive spectrum of pathogens that does not exist at any other location.

STRATEGIES AND EXECUTION

Manhattan, Kansas will soon have BSL-1 through BSL-4 laboratories for intellectual discovery in biosecurity and biodefense. These facilities present an opportunity for Kansas to add capacity for commercialization and manufacturing to support economic development and translate innovation to economic development. The areas of greatest need for industry partners working with select agents are:

- Collaborative intellectual support.
- Temporary lease access to BSL-2 and BSL-3 animal facilities.
- Benchtop space.
- Scale-up manufacturing equipment.

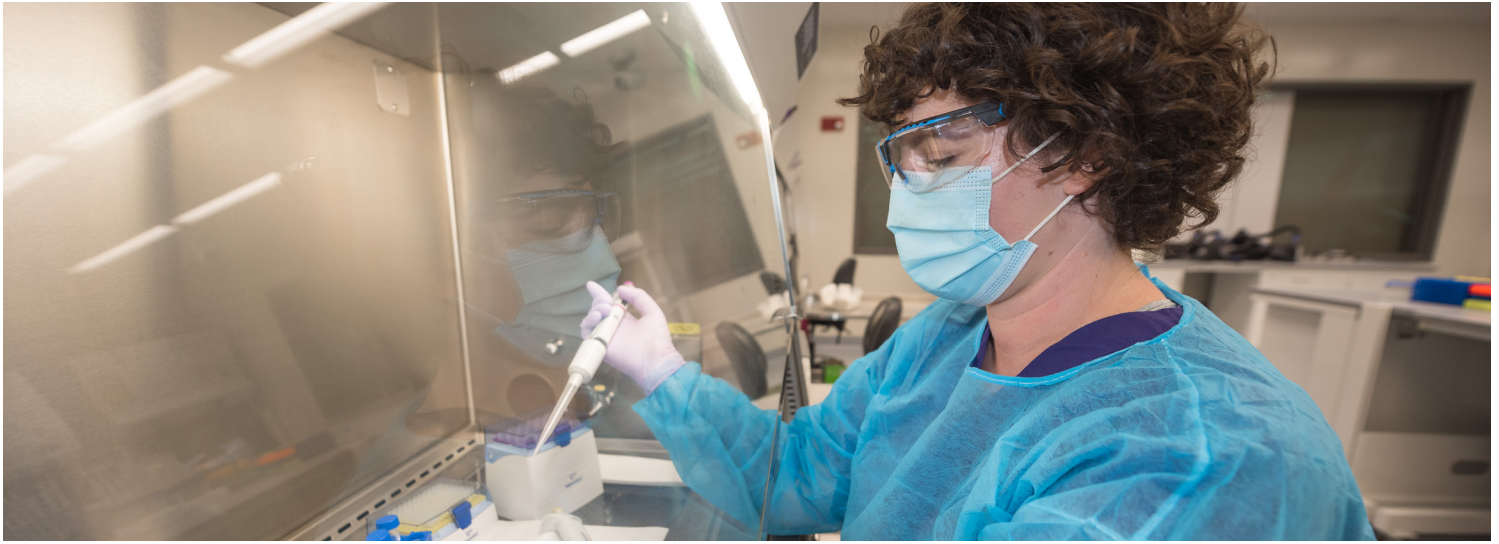
Strategy 1: Develop specialized containment and non-containment facilities that are accessible to private industry to advance research and development.

- The NBAF-BDM will support commercial scale-up for a limited number of federally designated BSL-3 Ag and BSL-4 select agents.
 - A BDM within the BRI, or BRI-BDM, will allow corporate partners to develop diagnostic, therapeutic and preventive countermeasures for a broader range of emerging, zoonotic diseases while also filling the scalable production gap. The BSL-3 containment space will also be able to provide emergency rapid manufacturing to protect the nation's animal and food supply during a crisis. A BRI-BDM will be central to containment and non-containment animal facilities and the K-State Veterinary Diagnostic Laboratory, or KS-VDL.
 - Commercialization of diagnostic, therapeutic and analytical components for emerging diseases does not always require containment access to traditional BSL-1 and BSL-2. Benchtop and animal facilities will provide a necessary component of laboratory capacity to support commercialization, product development and attract corporate-sponsored research.
 - The BSL-2 Ag Large Animal Research Center, known as LARC, expansion will accommodate critically short housing needs for animal acclimation and pharmaceutical safety studies. The LARC must be expanded to accommodate adult livestock and provide capacity for external private sector collaborators.
- The BSL-1 and BSL-2 core facility in the College of Veterinary Medicine, or CVM, will provide benchtop services for private-sector collaborators on imaging and molecular analyses, ranging from whole tissue to nucleic acid. This integrated laboratory will provide expert assistance in current techniques with confocal microscopy, laser-capture microdissection, flow cytometry, cell sorting, DNA/RNA sequencing and CRISPR technology on a fee-for-service basis.
 - Existing biotechnology resources in Manhattan will contribute to innovation and commercialization. State, federal and private entities near the university are committed to disease surveillance, animal models of disease, diagnostic testing for animal and plant disease and regulatory approval of pharmaceutical products.
 - » LARC is a 19,000 ft, BSL-2 research facility for animals ranging from piglets to calves.
 - » KS-VDL provides BSL-2 diagnostic testing for the animal health community in Kansas and serves as a member of the National Animal Health Laboratory Network for early detection of significant animal disease.
 - » Center on Emerging and Zoonotic Infectious Diseases supports faculty pursuing research innovation in emerging and zoonotic infectious diseases.
 - » National Agricultural Biosecurity Center located in Pat Roberts Hall unites biosecurity researchers with federal, state and local agencies to provide response resources for emerging agricultural threats.
 - » USDA's Center for Grain and Animal Health Research, adjacent to the K-State campus, contains the USDA Arthropod-Borne Animal Diseases Research Unit.
 - » Veterinary and Biomedical Research Center is a private BSL-1 and BSL-2 contract-research facility that guides biologic and pharmaceutical products through the Food and Drug Administration, or FDA, and USDA regulatory pathway.

Strategy 2: Expand global corporate partnerships and advancement of start-up, early stage, and emerging biosecurity and biodefense companies.

International and small companies matter. Job growth both nationally and in the state is not primarily fueled by large company relocation or branching, but rather by companies that have been in operation for one to five years. National data indicate that 75-80% of all new jobs are created by young, small companies. Small business formation and growth is accelerated by research, development and commercialization of emerging and niche technologies. For young companies, K-State can play a pivotal role in company success.

- Emerging pharmaceutical and biologic companies that work with select-agent products are particularly challenged to develop products for a potential disease outbreak. K-State will partner with these fledgling companies so they can grow, prosper and create jobs in Kansas.
- Existing state, regional and federal resources to support commercialization, investment and job growth will be leveraged to advance Kansas biosecurity and biodefense strengths.
 - » K-State Innovation Partners streamlines corporate engagement, technology commercialization, and economic development, providing a consistent experience for corporate collaborators as well as K-State innovators.
 - » Kansas City Animal Health Corridor supports 300 animal health companies — 56% of the worldwide industry.
 - » Animal Health Corridor's Animal Health Investment Forum provides an opportunity for emerging companies with early-stage animal health products to present their vision and business plan to venture capital investment firms and animal health companies.
 - » Regional and national venture capital firms with interests in animal health and agriculture are located in and around the Animal Health Corridor.
- » Small Business Innovation Research and Small Business Technology Transfer are federal programs that encourage small businesses to engage in research and development with the potential for commercialization. Small businesses that are successful with this program become very attractive to corporate interests.
- Building on success
 - » [U.S. CattleTrace](#) (Wamego): In 2016 the USDA, the Kansas Department of Agriculture, KSU-CVM Beef Cattle Institute, K-State College of Agriculture and private industry initiated a collaboration to explore livestock infectious disease and cattle tracing. Building on that work and resultant strong industry support from across the nation, state cattle organizations formed the U.S. CattleTrace corporation to collect and maintain secure data for rapid disease tracing. The company is now located in Wamego.
 - » [Merck Animal Health](#) (De Soto): K-State's porcine circovirus vaccine developed with Merck Animal Health is a recent commercialization success. Merck sells this vaccine to producers to prevent reproductive failure, diarrhea and respiratory disease.
 - » [Cocrystal Pharma](#): The university's newest industry collaboration is with Cocrystal Pharma for a product that combats SARS-CoV-2, the virus that causes COVID-19. It is an example of promising success in biodefense. License agreements grant commercialization rights to two antiviral therapeutic candidates discovered at K-State and Wichita State University for the treatment of coronavirus or norovirus infections. When Cocrystal, which is publicly traded, announced its license with K-State, its share price rose by more than 200%.



Strategy 3: Access to educated, skilled, talent is essential to every endeavor, but it is of critical importance to companies in the supremely complex world of biosecurity and biodefense. The attraction, education and retention — particularly of homegrown talent — is fundamental across the state’s economic sectors. In this K-State excels.

- K-State faculty are committed to training the next generation of scientists to study high-consequence pathogens.
- The high-containment training laboratory of the BRI provides experiences for students at many different levels — laboratorian, master’s, doctoral — in a setting without pathogens.
- In the simulated BSL-3 training lab, students learn to study, decontaminate, and dispose of high-consequence pathogens in a low-stakes setting.
- Protocols in the BRI’s BSL-3 and BSL-3 Ag labs allow students an opportunity to build their resumes while gaining hands-on experiences and prepare for academic and corporate careers.

“The BRI is one of the few facilities capable of handling research on dangerous livestock diseases in a high-containment setting. The breadth and depth of experience I have gained here is simply not available at other universities,”
— Daniel Madden, graduate student in the College of Veterinary Medicine.

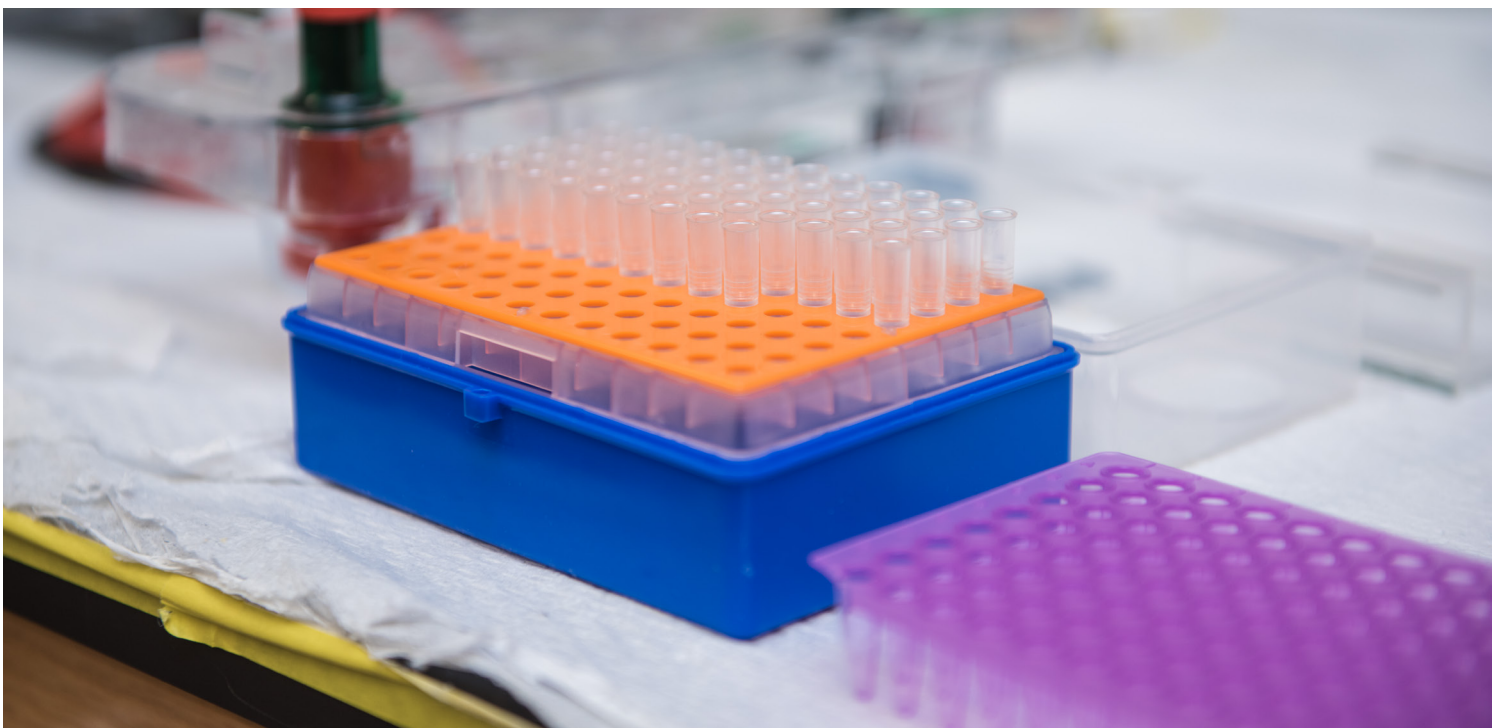
These and other resources help K-State attract the brightest and best graduate students and the unique proposed resources will ensure graduates of these specialized programs remain employed in Kansas, or will direct corporate resources towards work in these facilities in their future positions in the biologic/ pharmaceutical industry.

Strategy 4: Successful execution of the Biosecurity and Biodefense initiative will depend on prioritizing high-value opportunities to maximize return on the investment of these assets.

- Opportunity: Market analysis:
 - » Identify and prioritize high-value federal and private sector opportunities.
 - » Analyze staffing and resource needs of prioritized opportunities.
- » Delineate early opportunities and long-term investment opportunities
- Resources:
 - » Identify resources to advance the initiative though facility and talent needs — corporate engagement, state investment, venture capital partners, and federal initiatives.

GAPS AND NEEDS

- Faculty positions with start-up packages to strengthen capacity including virology, pharmacology, immunology and sustainable livestock production.
- Support personnel and lab equipment.
- Biologics Development Module within the Biosecurity Research Institute:
 - » Corporate partner access to develop diagnostic, therapeutic, and preventive countermeasures for a broad range of emerging, zoonotic diseases.
 - » Proof of concept to scalable production.
 - » BSL-3 containment to rapidly manufacture new products during crisis situations.
- BSL-2 Ag Large Animal Research Facility expansion:
 - » Accommodation of adult cattle and swine.
 - » Capacity for research faculty and corporate collaboration.
- BSL-1 and BSL-2 Core Facility:
 - » Coordinated benchtop services for faculty and corporate collaboration in imaging and molecular analyses ranging from whole tissue to nucleic acid.
 - » Capacity in confocal microscopy, laser-capture microdissection, flow cytometry, cell sorting, DNA/RNA sequencing, and CRISPR technology to support external collaborators on a fee-for-service basis.
- Comprehensive, integrated Kansas Veterinary Diagnostic Lab facility:
 - » BSL-3 capability to support the needs of collaborative partners.
 - » Expanded ability to support Kansas production and companion animal health
- » Secure National Animal Health Laboratory Network Tier 1 critical role in federal foreign disease outbreak response and surveillance testing programs.
- » Diagnostic services to industry partners in support of drug/vaccine regulatory approval.
- » Expanded industry access to field isolates and real-world infectious agents.
- » Facilitation of industry partnerships to develop novel countermeasures against diseases which threaten the economic viability of Kansas livestock producers.
- National Agricultural Biosecurity Center:
 - » Expansion of NABC response planning and training capabilities to ensure intellectual discovery and innovation is delivered to Kansas, the nation and the world.
 - » Enhanced data analysis and biosecurity information sharing.
 - » Matching funding program for companies to partner in the development of intellectual property, facilitating the success of emergency response and the advancement of emerging biosecurity companies.
- K-State Innovation Partners:
 - Added expertise in biosecurity/biodefense.
 - Streamlined and enhanced corporate engagement, technology commercialization, and economic development.
- Expanded programming capacity to provide consistent, seamless experience between corporate collaborators, key research faculty and College of Veterinary Medicine administrative leaders.





K-STATE 105

CONCEPT

K-State will create an “Every Town to Gown” initiative to enhance its presence in all 105 counties in Kansas. Through the initiative, K-State will deploy cutting-edge research and development, workforce development initiatives and more to solve relevant problems, support community and economic development and encourage connections between urban and rural areas. K-State will establish streamlined methods for businesses and communities statewide to access its innovation, talent and training through local liaisons and coordinated resources. This initiative will build on K-State’s status as a leader in community vitality by focusing on creating sustainable growth across the state.

ALIGNMENT

K-State’s campus extends to every county in Kansas, including research centers, experiment fields and extension services throughout the state. While the university’s statewide presence already attracts state, federal and private funding, strategically leveraging this core capacity will attract additional investment and corporate partners who are seeking to build their workforce and advance new innovations. From rural communities to state-of-the-art laboratories, K-State’s network connects resources to regional needs and opportunities.

K-State 105 promotes local collaboration and investments in the human, social and financial capital of our Kansas communities. K-State’s statewide presence, combined with the climate and soil variability across the state, provides unique opportunities for agricultural research. The university’s well-established network of highly respected extension professionals throughout the state, as well as partnerships with existing state and local economic development professionals, demonstrate K-State’s ability to achieve this aspirational goal.

DIFFERENTIATION

K-State 105 maximizes the university’s presence in all 105 counties and existing institutional capabilities to drive economic prosperity in the state. Initial phases will utilize existing resources to convene stakeholders to better understand statewide needs and match relevant university resources to targeted solutions. The goal of these efforts is to utilize existing resources to engage communities at a deeper level to identify challenges and determine if K-State can assist in accomplishing their goals. Later phases will include adding dedicated liaisons and units to deploy needs-based solutions. As these phases are deployed, the university will examine existing engagement processes and alter them to streamline engagement. Additionally, these phases will align with statewide economic growth plans including the Kansas Department of Commerce’s Framework for Growth, the Kansas Department of Agriculture’s Ag Growth Strategies and other Kansas Board of Regents Institution’s Building a Future Economic Prosperity plans.

STRATEGIES AND EXECUTION

The K-State 105 working group conducted interviews with economic development and workforce organizations and professionals, as well as business leaders throughout the state to learn of barriers to economic growth from their perspectives. The following strategies represent ways stakeholders have identified that K-State and our Regents' universities can be a partner or resource to overcome challenges and reduce barriers for economic prosperity.

Strategy 1: Creation of a Statewide Economic Development Liaison Network.

The Statewide Economic Development Liaison Network will meet to develop a comprehensive review of existing programs and expertise and to identify new opportunities for collaboration. This network will work to create a sustainable structure for collaboration with a lead partner that will coordinate the mission areas of research, education, service, and economic development. This network will function at the speed of business and will focus on translating innovation into economic development throughout the state. The Liaison Network will work to seek disruptive investment opportunities that align with other key economic development stakeholders to advance transformational change.

Strategy 2: Deploy Regional, Community and Business Support Liaisons.

The network will be comprised of regional, community and business support liaisons to coordinate solutions and leverage the capabilities of K-State. The network will leverage local extension agents while providing a streamlined point of entry to university engagement. Positions to support the network will be co-funded with a joint reporting system to K-State, state agencies and local or regional entities.

Centralized units at K-State will provide technical assistance, workshops and support to the regional community, as well as business support liaisons. Staff at the Institute will assist in coordinating the economic development liaison network and will work with K-State's extension agent at the local level. These targeted communication efforts will increase the awareness of ways to partner with the university.

Liaisons and partners will hold forums to gain consistent feedback from regional stakeholders regarding their economic growth challenges and needs. As new innovations and knowledge are generated from K-State's research and teaching activities, liaisons and extension professionals will disseminate relevant information to regional stakeholders. This information will aim to provide solutions to regional challenges and improve commercialization to drive innovation and job creation.





Execution

Three themes have been identified as potential areas of opportunity for K-State to advance economic prosperity in Kansas and potential tactics for execution are identified are included below.

Solving technical challenges for Kansas companies:

- Identify pathways to seek federal, state, local, private and nonprofit resources to make technical assistance, research and training programs accessible to small and emerging companies, offsetting the costs of engaging the university and creating nontraditional funding sources to support startups.
- Identify faculty who are interested in collaborating with small businesses on Small Business Innovation Research and Small Business Technology Transfer grants and connect them with Kansas companies.
- Identify research centers that are or can be accessible for technical assistance for use by small to medium size businesses. Establish better communication channels to share research and service offerings and research results and new innovations throughout the state.
- Coordinate the development, testing and commercialization of food and agriculture innovations with private sector partners.

Supporting entrepreneurship and new business creation:

- Coordinate entrepreneurial support and training efforts with other entities working to develop new businesses around the state.
- Develop a National Science Foundation Innovation Corp program to use experiential education to help researchers gain valuable insight into entrepreneurship, industry requirements and challenges.
- Create a program that works with the Kansas Department of Commerce's proposed Innovation Network to connect new businesses with successful mentors. Similar to the Master Gardeners and Master Community Facilitators programs, a Master Business Leader and Entrepreneur Program would provide training and deliver information and experience to local communities.

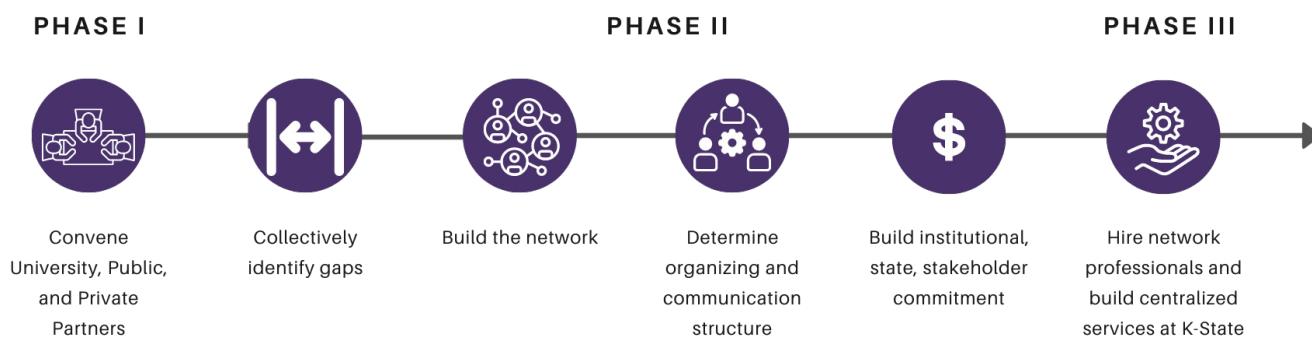
Workforce development:

- Effective internships improve students' employability, academic outcomes and career goals while building the talent pipeline for Kansas companies. Through the K-State 105 initiative, internships would be enhanced to develop work-based, service-learning experiences. Year-round internship programs would extend student experience and mentorship with Kansas companies through combined on-campus and remote internships to assist with talent attraction and retention of graduates to overcome workforce shortages in the state. K-State also will collaborate with regional technical and community colleges to provide industry-relevant training and education that includes stackable credentials and pathways to degrees for in-demand occupations in target sectors.
- Recruiting and retaining businesses and attracting talent requires addressing local community development needs such as vibrant business districts, housing, healthcare and communications. K-State's Center for Engagement and Community Development's reimagining process will identify opportunities to enhance campus and community partnerships through research, teaching and service to promote vitality, livability and quality of place in our state's economic regions.
- The implementation of workforce-related initiatives in the Kansas Agriculture Growth Strategy including the promotion of interdisciplinary education, high school student career immersion experiences and improved military veteran career and education transition opportunities will be an important advancement for K-State 105.

Implementation phasing, milestones and required resources:

The K-State 105 initiative will require external resources for aggressive implementation to occur, especially to fund the convening and coordination capacity needed to truly leverage K-State's existing presence in all 105 counties and centralized resources to support statewide needs. In addition to investment from federal, state, local, private industry and nonprofits, this initiative will require a commitment from communities and regions, as well as university stakeholders and partners. Public and private partners who will help execute the strategies, include, but are not limited to:

- Small Business Development Center — coordinate small business and entrepreneur research and technical assistance needs.
- Kansas Department of Agriculture — coordinate the implementation of the Kansas Agriculture Growth Strategy.
- Kansas Department of Commerce — as the state's lead economic development agency, administer programs and services to support businesses, grow the economy, and improve quality of life across the state.
- NetWork Kansas — leverage network of resources to assist small businesses and entrepreneurs.
- Kansas Board of Regents — coordinate the implementation of strategic initiatives across the Pillar 3 focus of the KBOR strategic plan.
- Business Resources for Innovation and Exporting Center — assist in matching regional needs with resources including access to capital.
- Local economic development partners — partner with local county extension to identify regional needs and opportunities related to business recruitment, retention and growth, workforce development and community vitality needs.



GAPS AND NEEDS

Achieving the full potential of K-State 105 will require addressing several critical gaps and needs. While more than 96% of businesses in Kansas are small businesses, current economic incentive models and regulations are geared toward larger businesses. With modernized incentives proposed in the Kansas Framework for Growth, streamlined processes and capacity-building systems, K-State 105 will support the growth of businesses with the greatest potential to provide family-sustaining jobs throughout the state. Working across disciplines and in partnership with the private sector, K-State 105 will ensure that the education K-State provides is matched to careers with the greatest opportunity to grow the state economy.

- Capacity: While there are units at K-State that deliver some components of these strategies, none have the bandwidth to deliver them statewide. Through training, networking and staffing, K-State can build capacity to execute the K-State 105 strategy.
- Economic development experience and training: K-State Research and Extension has an existing presence in 105 counties that is valued, however, extension professionals don't all have experience or expertise in economic development. K-State can equip extension professionals with awareness of centralized resources that can be engaged to assist communities and companies in solving their economic prosperity challenges.
- Communications and culture:
 - » While significant knowledge resources exist at K-State, there is a lack of awareness of those capabilities across the state. In addition, stakeholders are unaware of how to engage K-State or who to contact to help facilitate access.
 - » The activities and cultures of university units, extension stations and economic development partners are disparate and have varied priorities.

OVERARCHING STRATEGIES AND IMPLEMENTATION

K-State’s Pillar 3 plan creates an initiative that will become a part of the university’s long-term strategic plan and will be aligned with other related initiatives to increase efficiencies and impact and avoid duplication. The initiative will be focused on issues of primary importance to state policymakers and citizens of the state, jobs and prosperity. This initiative will connect university efforts directly to the national and international marketplace where jobs and prosperity are a match between our capabilities and market needs at a scope and scale that has never happened before. The institution will naturally evolve in ways to take full advantage of the initiative, the global marketplace, and the issues of importance to Kansans. As with any other innovative advancement, K-State of the 21st century will evolve at much greater velocity than ever before.

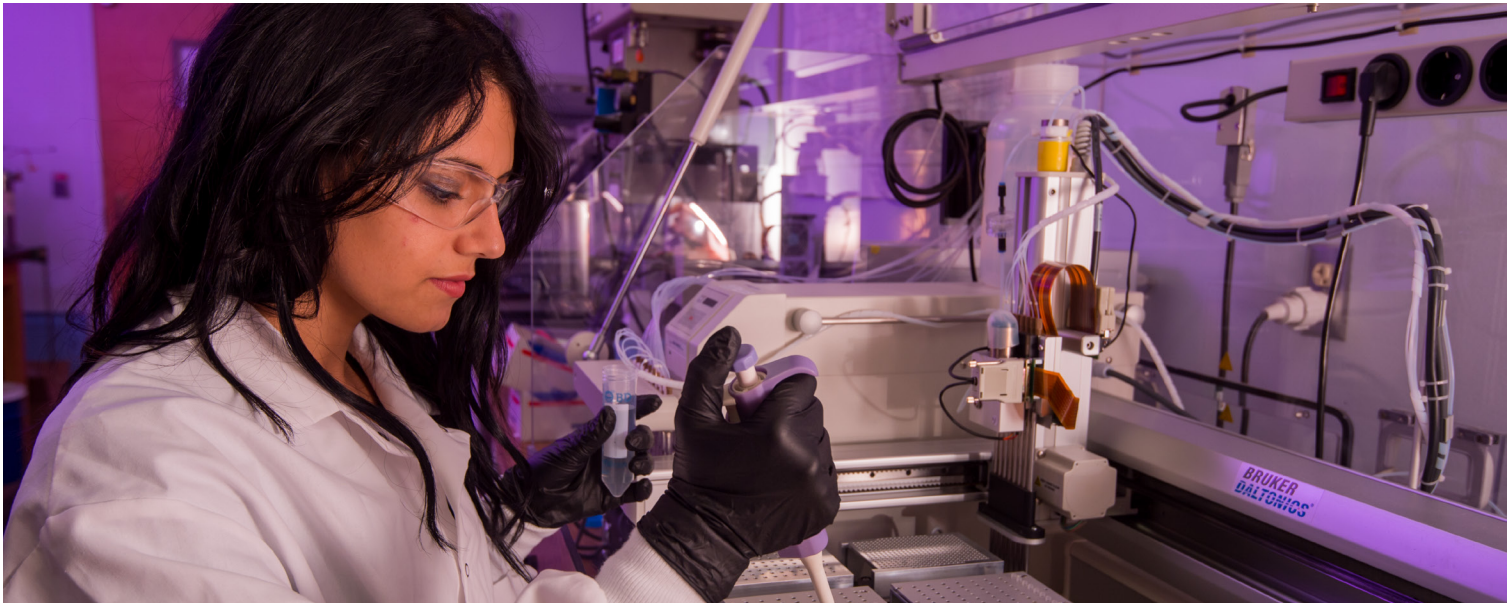
BENCHMARKS

With appropriate external investments that allow full implementation, the goal of K-State’s Pillar 3 initiative will be to support the creation of 3,000 direct jobs and \$3 billion in direct investment in the state within the next 10 years. Short-term progress updates and benchmark dashboard will be shared on a university website.

	Baseline (2019)	2 years (2020-2021)	3 years (2020-2022)	5 years (2020-2024)	10 years (2020-2029)
Direct jobs (FTE)	587	1,000	1,100	1500	3000
Direct investment	\$154M	\$400M	\$550M	\$1B	\$3B

STAFFING AND ROLLOUT

The K-State Pillar 3 plan was developed by interdisciplinary faculty and staff who consulted with internal and external stakeholders to develop this bold plan. K-State has shared the plan’s development through several meetings with academic leaders. The plan will be integrated with the university’s strategic plan refresh and discussed broadly both internally and externally. Audience-focused materials will be created to support the initiative rollout and execution and plans will be shared on a university website. A forthcoming market study will assist in validation of the market alignment and opportunity scope and prioritization of the plan’s implementation activities. The initiative will be staffed primarily by the Office of the Vice President for Research, K-State Innovation Partners and KSU Foundation staff, but will require university-wide engagement. Academic leaders will play an important advisory role and be essential in catalyzing these efforts.





AGGREGATE SUPPORTIVE METRICS

While Pillar 3 has two desired metrics – direct job creation and investment – there will be supportive metrics tracked that drive jobs and dollars including:

- Grants prepared and received — Office of the Vice President for Research.
- Fee-for-service agreements and revenue — Deans of the colleges
- Peer reviewed publications — Deans of the colleges.
- Number of bachelor's and graduate degrees granted — Office of Institutional Research and Assessment.
- Bachelor, Master, PhD, and Doctor of Veterinary Medicine graduates being retained and employed in Kansas — K-State Career Center.
- Number of certificates or micro-credentials created and granted — Office of Institutional Research and Assessment.
- Talent pipeline into targeted economic sectors — K-State Career Center.
- Philanthropy into framework initiatives — KSU Foundation.
- Stakeholder knowledge gains — K-State Research and Extension.
- Technologies, practices or behavior changes adopted by stakeholders — K-State Research and Extension.
- Licensing agreements and royalty revenues — K-State Innovation Partners.
- New businesses attracted or created — economic development partners.
- Existing businesses expanded — economic development partners.
- Jobs retained — economic development partners.
- Net annual payroll from jobs created — economic development and community partners.
- Foreign direct investment — Office of the Vice President for Research and economic development partners.
- Capital investment-businesses and infrastructure — economic development and community partners.
- Harvested equity — K-State Innovation Partners.

AGGREGATE GAPS AND NEEDS

Facilities: In addition to the specific infrastructure needs detailed for each focus area, commercial real estate will be critical to realize the economic outcomes expected through this initiative. Lab space and other innovation-enabling spaces for start-up companies, small businesses and corporate co-locations will be needed.

Startup capital: Resources to support new and emerging companies including evergreen funds and other venture capital to accelerate the commercialization of innovation and create jobs.

Capacity: Additional faculty and staff capacity will be necessary to accelerate and deliver the K-State Pillar 3 vision.

Culture: The activities and cultures of university units, extension stations, industry, government and economic development partners are disparate and have varied priorities. Efforts to convene and build collaboration will be necessary to build productive partnerships.

Institutional incentives and rewards: A transition to rewarding interdisciplinary and systems-focused integrated research, education and extension programs will be necessary. A mindset of collaboration and performance metrics that incentivizes cooperation across departments, colleges and beyond the university will be key.

New market validation and awareness: As the global agricultural landscape continues to shift over the coming decades, K-State must stand ready to provide awareness and facilitate adoption of new technologies, techniques and consumer-driven market demands that may challenge what we historically understand as agriculture.

Broadband and cellular access: Connectivity plays an essential role in how rural communities and businesses employ technology, deliver services and connect even the smallest community with the rest of the world. Broadband and reliable cellular deployment to rural areas will ensure that Kansas, and the nation, will stay at the forefront of technological innovation and development.

Budget restoration: K-State's bold prosperity-building Pillar 3 initiative rests squarely upon the research and educational excellence of the university. That excellence has been deeply challenged due to repeated reductions in state funding to the university. There have been real and damaging consequences because of these reductions that undermine the very excellence that Pillar 3 is designed to leverage. It is therefore essential the state close this financial gap by full restoration of K-State's base budget.



ACCOUNTABILITY

President

The university president oversees the institution's operations and cultivates collaborative relationships with a broad range of diverse individuals and groups to enhance the university's substantial strengths in research, academics and outreach. The president serves as a champion for the university's strategic plan. Retired U.S. Air Force Gen. Richard B. Myers returned to his home state and alma mater in 2016 to serve as the 14th president of Kansas State University.

Vice President for Research

The vice president for research provides leadership for the acquisition of research funding, the planning and development of academic research space, patenting, commercialization, the incubation of new companies and recruiting of corporate research partners, and public outreach. The vice president for research will be a key leader in support of K-State's deep commitment to developing economic prosperity locally, regionally and across the state in fulfillment of its land-grant mission and in alignment with the Pillar 3 plan.

K-State Innovation Partners President and CEO

Innovation Partners facilitates collaboration between the university, industry and communities through corporate engagement, technology commercialization and economic development. Kent Glasscock is the president and CEO of K-State Innovation Partners. Prior to joining the organization in 2003, Glasscock spent 16 years in public office. The Innovation Partners President and CEO will facilitate and staff implementation of Pillar 3 plans under the direction of the vice president for research and university president.

KSU Foundation President and CEO

The KSU Foundation is K-State's strategic partner for philanthropy. The organization inspires and guides philanthropy to boldly advance K-State. Foundation staff members work to secure charitable contributions from individuals, corporations and foundations to support identified priorities for the university. The Foundation also serves as a real estate development partner for the university adjacent to the main campus in Manhattan, providing state-of-the-art commercial real estate for partners who enhance academics and research on campus, contribute industry expertise, promote regional and international collaborations, access student talent, and align with the university's land-grant mission. Greg Willems serves as the president and CEO of the KSU Foundation. Willems has held executive fundraising positions at the University of Hawai'i, University of British Columbia and Texas A&M.

Note from President Myers

THE KEY TO SUCCESS: SHARED COMMITMENT

Kansas State University's Pillar 3 initiative is aspirational, bold and global in reach with resultant profound economic impact across Kansas. It has the power to transform and advance the food-related sectors in all 105 counties of the state with leading-edge, 21st century innovation, education, and outreach. Our university has the talent, capability and commitment to transform this plan into action that will drive direct job creation across Kansas. We are ready to begin this work.

The scope and scale of our plan will necessitate investments well beyond the deeply challenged means of K-State. K-State understands that Pillar 3 programming must attract the interest and financial support of many partners and this will be an area of early concentration. These partners include:

- Global and national corporations.
- Kansas businesses.
- Federal agency/corporate sponsored research.
- Philanthropy.
- National/family/corporate foundations.
- Kansas regional/community economic development organizations.
- Local units of government.

Our efforts alone, however, will not be enough to assure long term success. The ultimate key to Pillar 3 success will be a shared years-long commitment by the Kansas Board of Regents to Pillar 3 of the "Building a Future" strategic plan. Active, sustained, fully committed KBOR leadership is required to advance Pillar 3 and retain its focus on system budget restoration. To be clear, for Kansas State University to aggressively advance our bold Pillar 3 initiative, the university must have a level of financial stability that can only be realized by full restoration of its base budget from successive years of reductions.

This KBOR-university shared commitment will be powerful. Aggressive KBOR leadership and messaging will be essential to gaining the support and commitment of public elected and non-elected officials:

- Governor.
- Legislative leadership.
- Kansas legislature.
- Kansas Department of Commerce.
- Kansas federal delegation.

Pillar 3 is an exciting and promising Kansas Board of Regents strategy. K-State has a great plan and looks forward to its implementation. It is important to recognize that its success depends on broad-based, meaningful, shared commitment by KBOR and other partners to accelerate state prosperity, job creation and direct investments. We can do this. K-State stands ready.

Let's commit together and get going.

- Richard B. Myers, Kansas State University President



Kansas State University embraces diversity, encourages engagement and is committed to the discovery of knowledge, the education of undergraduate and graduate students, and improvement in the quality of life and standard of living of those we serve.

KANSAS STATE
UNIVERSITY