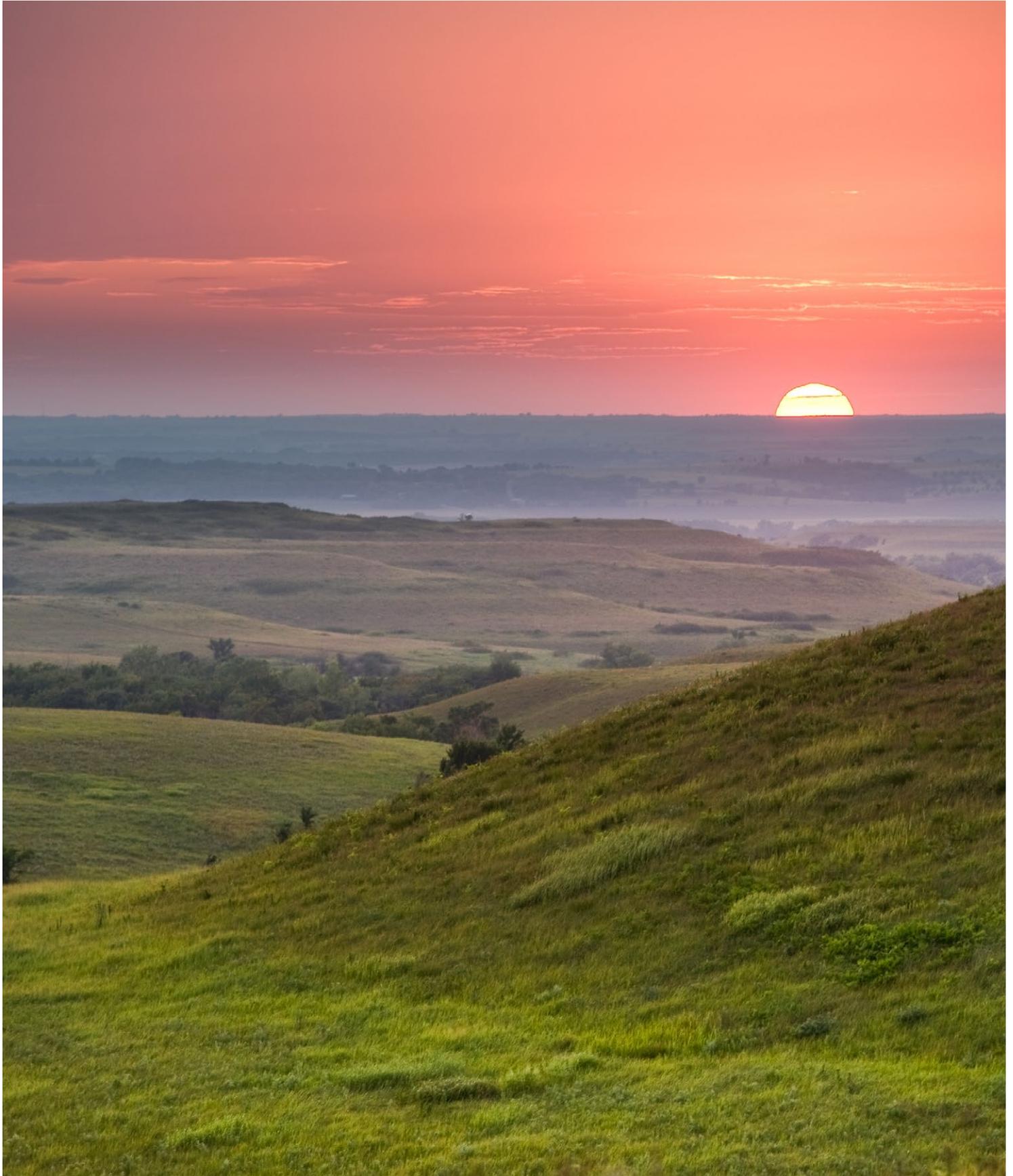


Building Prosperity for Kansas:

The Global Leader in Global Food Systems



Section 1: The Case for a Global Initiative

The relationship between a growing world population and the need to produce more food to feed more people is broadly understood. What may surprise some is the expected doubling of the number of people entering the middle class by 2030. These young and middle-aged adults will expect a middle-class lifestyle, which includes a safe, higher-quality diet that contains more animal protein. From Syngenta's 2012 Industry Outlook, global meat demand is expected to increase 50% by 2025. Additional food animals will require greater amounts of grain. However, limitations on arable land, working-age population and other resources may not allow producers to keep pace with demand via existing technologies.

A recent United Nations report

estimates the world population is 7.2 billion people today, growing to 8.1 billion by 2025 and 9.6 billion by 2050, an increase of 12.5% and 33%, respectively. Most of the population growth will come from developing regions such as China, India and Africa.¹

Other notable findings in the U.N. report further illustrate the need:

- The population in developing regions is projected to increase from 5.9 billion in 2013 to 8.2 billion in 2050.
- In contrast, the population of developed countries is expected to remain largely unchanged during that period, at around 1.3 billion people.
- Africa's population could increase from 1.1 billion today

to 2.4 billion in 2050, and potentially to 4.2 billion by 2100.

- Life expectancy at birth for the world as a whole rose from 47 years in 1950-55 to 69 years in 2005-2010 and is projected to reach 76 years in 2045-2050 and 82 years in 2095-2100.

For the first time in history, a truly global middle class is emerging. By 2030, it will likely more than double in size, from 1 billion people today to at least 2 billion. It is estimated that the European and North American middle classes will shrink from about 50% of the total world population to just above 20%. Rapid growth in Asia will cause its share of the new middle class to more than double from its current 30%. This massive middle class expansion will be accompanied by

an equally staggering increased purchasing power, *potentially adding \$3.5 trillion in annual consumer food-related spending by 2025.*

Large international food companies have recognized this shift in global demographics and the pressure it will place on supply and demand for meat and grains.

Monsanto estimates that by 2020 there will be a productivity gap of about 22 million hectares of arable land needed to meet demand. The company predicts 66 million hectares will be needed, and the U.S. Department of Agriculture estimates that only 48 million hectares will be available in 2020. *"The growing demand for grain cannot be met with more acres ... the clear need is for more yield through productivity."*²

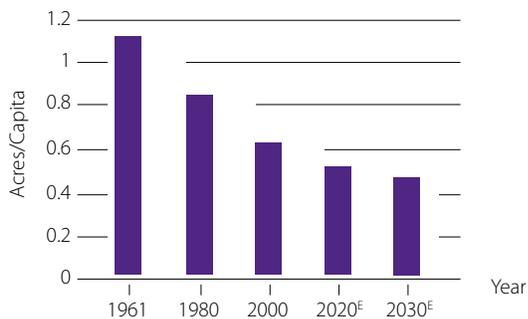


Fig. 1.0 Arable acres per capita worldwide (Monsanto, 2012)

Monsanto also predicts that a wealthier, growing global population will seek improved diets and increased meat consumption. As per capita incomes increase, animal protein consumption rises rapidly, which in turn drives demand for feed grains.

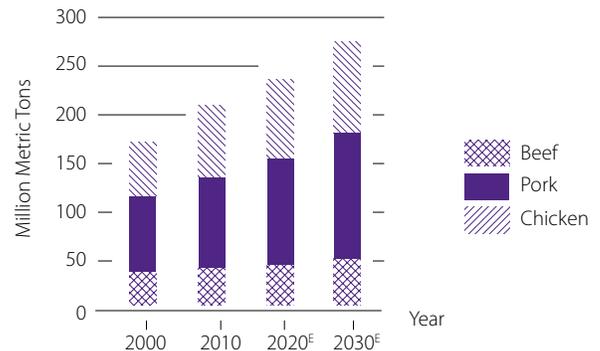


Fig. 2.0 Predicted growth in meat consumption (Monsanto, 2012)

An additional global trend with profound impact is the flattening of global productivity increases since 1990. This has occurred in part due to chronic underfunding of corporate and governmental research in food and agriculture at both the basic and applied areas. Current research and productivity trends exacerbate the supply/demand misalignment and will underscore long-term market opportunities.

Section 2: Expanding Global Leadership

Kansas State University is already a global leader among research universities in addressing this world challenge, and this leadership can grow through a unique focus on

private sector needs with regard to talent, innovation and professional training in global food systems.

The confluence of factors — global population growth, progressive

climate change, the rise of the global middle class, and the flattening of agricultural yields and productivity — create a major opportunity to build long-term

prosperity for the state of Kansas. With the imminent construction of the \$1.2 billion National Bio and Agro-Defense Facility (NBAF) on the Kansas State University

Manhattan campus, the window is open to claim the global leadership position in global food systems.

The current timeline for NBAF calls for work to start on the 580,000-square-foot main laboratory this spring, with an estimated date of full operation in 2020. The current federal budget contains \$404 million in appropriations for the plant.

To realize the full potential of NBAF, Ron Trewyn, current Kansas State University vice

president for research, has been named to lead efforts on behalf of the university. Trewyn has been involved in the effort to build the lab in Kansas since the 1990s and has an extensive network of contacts and relationships within the federal and state governments, as well as industry. He has already established working partnerships with Iowa State University, the Lawrence Livermore National Laboratory and many companies. With his encouragement, Midwest Veterinary Services

built a \$5 million veterinary and biomedical research facility in the Manhattan area.

The Biosecurity Research Institute (BRI), located in Pat Roberts Hall, represents a tremendous asset when striving for global leadership. The BRI has attracted a world-class director in Stephen Higgs and several top scientists. The co-location of a biosafety level-3 (BSL-3) facility (BRI) and a BSL-4 facility (NBAF) creates one of the world's greatest concentrations

of facilities for research in crop protection, animal health and food safety. Working closely with the federal facility at Plum Island, the BRI has started research on highly contagious animal viruses, some of which can be zoonotic and infect humans. The work has focused on classical swine fever, African swine fever and Rift Valley fever. Work on Japanese encephalitis, bovine pleuropneumonia and other agents can be launched as needed.

Section 3: The Global Food Systems Concept

NBAF and BRI, in conjunction with the role of the region's Animal Health Corridor, represent just one pillar of global food systems. As the schematic in **Figure 3.0** shows, there are complex relationships throughout the value chain of global food systems that Kansas State University can support.

Consumers are increasingly aware of the food supply chain, including aspects of food safety, food ingredients and food production. It is important that the university collaborate to take a "field to fork" approach to food safety and food security as well as improved nutrition and health.

The focus is food crops – wheat, sorghum and millet – and food animals – cattle, pigs and sheep – at the production, processing, distribution and protection levels. Kansas State University can look at developing and commercializing new technologies and practices; attracting a talented workforce; providing leadership in food safety, security and production; and building on relationships in the public and private sectors.

The keys to building long-term prosperity for the citizens of Kansas through the global food systems initiative lie at the intersection of innovation, education and targeted

industry.³ The state already has tremendous capability and facilities to support the university's role as the global leader in global food systems.

Current and planned global food systems facilities:

- National Bio and Agro-Defense Facility (NBAF)
- Biosecurity Research Institute (BRI)
- USDA-ARS Center for Grain and Animal Health Research
- Kansas Department of Agriculture headquarters
- International Grain Complex

Institutional organizations to support economic development, intellectual capital and commercialization:

- TechAccel initiative to commercialize food and food production innovations
- Kansas State University Institute for Commercialization (KSUIC)
- Kansas State University Research Foundation (KSURF)
- KSU Foundation
- Bioprocessing and Industrial Value-Added Program (BIVAP)
- Advanced Manufacturing Institute (AMI)

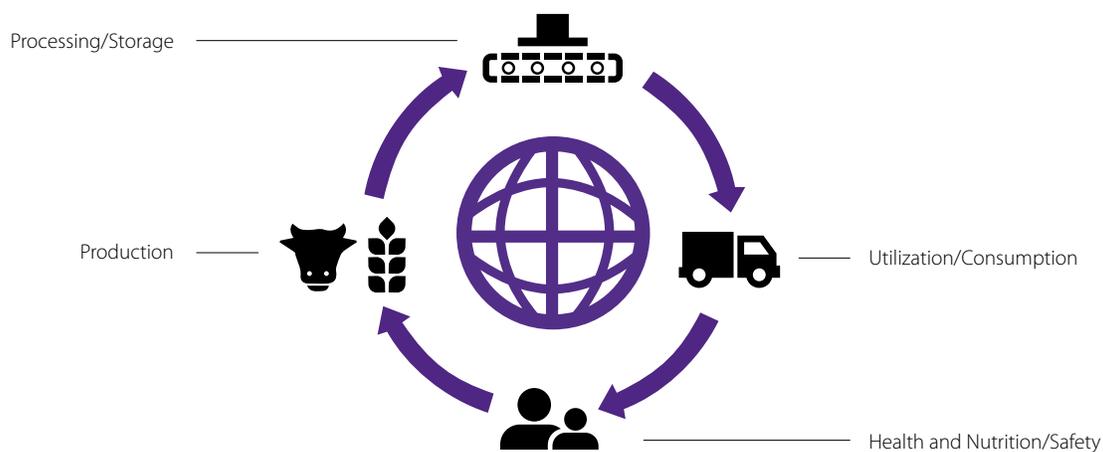


Fig. 3.0 Global food systems expertise

Section 4: Summary

Realizing the potential of NBAF and the global food initiative requires strategic planning and thoughtful investment. The Kansas State University master plan integrates with the city and state to provide a planned approach to growing the north campus corridor. The university currently has 39 acres available for commercial and research development. A recent study by Kansas City-based real estate firm CBRE estimates the need to house an additional 1,200 employees over time will require 400,000 more square feet of new research and office space, with a total land requirement of 70 acres.

To secure and maintain the global leadership position on a permanent basis, the university will need to address a number of critical needs:

- Retaining and attracting top faculty members
- Creating public infrastructure to expand the global food systems research corridor
- Building facilities that allow corporate-university partnerships to scale

The visionary goals presented in Kansas State University's 2025 strategic plan will be advanced through the global food systems initiative. Next steps for the university include generating dialogue across all campuses to outline specific resources, benchmarks and outcomes needed to achieve global leadership.

Building on Kansas State University's land-grant heritage, the global food systems initiative leverages public and private sector funding to create a global center focused on four objectives:

1. Conducting research to enhance food production, food safety, human and animal health, and food security
2. Attracting and developing the future food systems workforce
3. Discovering and commercializing innovative technologies to enhance productivity and profitability
4. Providing counsel and thought leadership to industry on a range of complex global food issues

This initiative will bring investments and jobs to Kansas, increase collaboration among suburban, urban and rural constituencies and provide regional leaders with the confidence and solutions they need to meet the economic, social and regulatory challenges facing 21st century global food needs.

By leveraging its history as a land-grant institution, Kansas State University can use this unprecedented opportunity to create long-term prosperity for the citizens of the state of Kansas. The leadership is in place, the time is now, and Kansas State University is ready to become *the undisputed global leader in global food systems.*

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1. United Nations, 2013
 2. Monsanto, 2012
 3. Federal Reserve Bank of Cleveland, 2005

