



CORN

The Kansas corn industry fills a significant role in the agriculture economy. Corn is the largest crop grown in Kansas, both in bushels produced and in economic contribution. The corn sector supplies grain and silage to the cattle sector, as well as supplies feedstock for ethanol and thus, ethanol by-products. Substantial resources have been invested in corn research to increase yield and efficiency of production, including in the areas of seed genetics, irrigation technology and data management. As a leading livestock producer, Kansas is a major customer for corn as a feed source, especially within the beef production chain. Continued advancement in bioscience is creating additional potential for corn to contribute to additional products and bring increased manufacturing options to the state.

A number of challenges face the corn industry and present potential barriers to future growth within this sector. Several policies, both local and federal, are threatening the financial stability of corn farmers and prevent expansion. Expanding the export market will be dependent on improved transportation infrastructure. Concerns among consumers both domestic



and international question the role of genetic technology in corn production and in fuel use, as well as nutritional issues. Ever-depleting groundwater sources for irrigation continue to be a threat to farmers, particularly in certain regions of the state.

A long-term growth strategy for the corn sector will require input and collaboration among many key partners, both public and private. Continuing development of policies and technologies to maximize water use will play a major role in future success. A strong relationship with the ethanol industry will be key in encouraging increased production of ethanol, thus increasing demand for corn. Potential exists to develop new business markets within the state that would involve research, processing or manufacturing corn and corn products.

A strategic growth plan for Kansas corn developed in collaboration among stakeholders could make a significant impact on the corn industry.

STATUS

The corn sector of the Kansas agriculture economy includes the production of corn and the first purchaser uses of that corn such as livestock feeders, ethanol plants and exporters. Kansas corn production was 686.4 million bushels in 2017. The corn sector of the Kansas agriculture economy is built on supplying grain and silage to the cattle feeding sector, as well as serving as feedstock for Kansas ethanol plants, and 66.45 million bushels were exported from Kansas in 2017. Kansas ranks 7th in corn production in the nation and has been as high as 6th depending on the growing season. Corn is the leading crop in Kansas in terms of bushels produced and economic contribution.

According to estimates prepared by the Kansas Department of Agriculture and based on the IMPLAN economic data model, the corn industry in Kansas has a total direct output of over \$2.2 billion and creates 4,806 jobs in the state. Through indirect and induced impacts, the industry supports a total of 15,675 jobs and provides a total economic contribution of \$3.85 billion. The ethanol industry, a primary supporter of the corn industry in Kansas, provides an added 2,623 in total jobs, as well as a total economic contribution of over \$1.2 billion.

Not every part of Kansas is well suited to the production of corn, but trait technologies are quickly increasing the number of acres that are suitable. While a key climatic challenge is in the amount of rainfall received, many areas of the state utilize irrigation for corn production. Therefore, irrigation is a critical component to allow the quantity of corn produced in Kansas to meet demand, particularly in the areas of high feed usage. In regions of the state over the Ogallala Aquifer, water availability for irrigation has declined or disappeared, making corn production more difficult and indicating future challenges as water supply becomes increasingly depleted.

There is public concern about the use of genetic technology in corn production, and debate exists about whether that corn is suitable for use in food both in the United States and abroad. Another debate centers on whether corn should be used for fuel, ethanol in particular, as opposed to food and feed. This debate intensifies in times of high corn prices, although close study reveals that ethanol DDGS continue to provide a viable feed source from ethanol production. Farmers, seed companies and exporters are challenged by worldwide differences in the regulatory acceptance of new corn genetics.

Continual improvements in irrigation technology will work hand in hand with improved genetics to allow corn to be grown in those parts of Kansas where only limited irrigation is available, as well as those parts where water right holders want to stretch the usable lifetimes of their wells. Continued incremental improvements in other areas of the production system such as increased soil health, management to weather patterns, incorporation of additional data in farm management, access to useful crop insurance, and targeted pesticide use and application technologies all will help push up production.

As production continues to increase, more demand will be needed. Traditional outlets for corn including livestock, ethanol and exports are critical and need ongoing attention and effort to sustain and increase demand. Exports can be increased through expanded trade promotion authority and access to additional markets around the world. Further, increased efficiency in the regulatory approval of genetically engineered corn globally would allow new technology to come to market sooner so that corn produced in Kansas from that technology could be shipped around the world. Opportunities for corn exist in emerging technologies as well, such as renewable-based chemical production.

OPPORTUNITIES

In order to develop a strategic growth plan for the corn sector, it is important to understand the areas where Kansas has a comparative advantage and the best opportunities for growth or expansion.

Factor	Implications for Growth and Development Opportunities
<p>Alternative Uses and Bioscience Business Development</p>	<p>Corn is used in the production of a wide variety of products from those that are very familiar such as livestock feed, ethanol, high fructose corn syrup and food products (e.g., corn flakes, tortilla chips) to less known products like resins, plastics and pharmaceuticals. With continued advancements in bioscience, corn has the potential to contribute to even more products and Kansas can be home to the next major efforts in manufacturing operations and cutting-edge product developments.</p> <p>The state of Kansas offers a variety of incentive programs for qualified companies involved in many local economic development programs throughout the state. These incentives, which may be subject to approval by the Kansas Department of Commerce, range from specific tax exemptions and credits to workforce assistance and more.</p> <p>KDA is engaged in the Strategic Growth Initiative, a pilot program as part of the Land in Kansas statewide economic development initiative to help counties and communities proactively seek potential business growth opportunities.</p>
<p>Big Data Use</p>	<p>As more and more data become available related to cropping systems, there are more opportunities to use the data to improve profit margins for corn, thereby increasing both the fiscal and economic impact and the number of acres used for corn production.</p>
<p>Ethanol</p>	<p>Expansion of ethanol capacity will create additional demand for Kansas corn in addition to the economic impact in rural Kansas of increased capital investment and job creation.</p> <p>Making sure corn ethanol is favorably included in the Renewable Fuel Standard and initiatives such as Prime the Pump and the U.S. Department of Agriculture’s Biofuel Infrastructure Partnership (BIP) grant will build demand for ethanol by increasing consumer access to and awareness of E15 and E85.</p>
<p>Export Infrastructure</p>	<p>Maintaining and improving export infrastructure will help ensure demand for Kansas corn around the world. Rail loading facilities for both grain and ethanol are important in addition to maintaining good roads and waterway access.</p>
<p>Genetic Advancements</p>	<p>Many seed corn companies already have drought-tolerant product offerings that can be expanded upon to offer genetic traits to make corn more suitable to the arid climate of Kansas without significant yield loss. This would increase the number of acres on which corn can be produced.</p>

Factor	Implications for Growth and Development Opportunities
<p>Genetic Advancements cont.</p>	<p>The amount of resources invested in corn research is extraordinary and has led to great advancements in corn yield. Continuing to push yields up and expanding the growing conditions in which those increased yields can be achieved is a big opportunity for the sector. Specializing corn genes and hybrids for end use would allow greater efficiency for end users and potentially increase demand for corn. For example, certain varieties are better suited to silage production than others.</p> <p>It is uncertain whether the market would support varieties suited for specific livestock such as beef, swine or poultry, and whether specific varieties would increase yield in ethanol plants.</p>
<p>Irrigation Technology</p>	<p>Some of the highest corn yields in Kansas are achieved under irrigation. As available groundwater for irrigation is reduced it is important to find ways to achieve the same economic return with less water. Being more efficient with irrigation systems will help reduce water use and potential pumping costs while maintaining good yields.</p>
<p>Land Availability</p>	<p>Kansas has the second most farm land of any state with roughly 90 percent devoted to agriculture.</p>
<p>Leadership</p>	<p>Kansas is home to strong leadership in the corn sector, creating additional investment opportunities.</p>
<p>Livestock Feeding</p>	<p>Kansas is a top three state in cattle production, a top ten producer in hogs, has a fast-growing dairy sector, and is in line for expanded poultry production. The livestock feeding sector is a major customer for corn producers. Expanding the number of livestock being fed in Kansas will increase demand for Kansas corn. Use of DDGS in livestock and pet feeds is a resource for value-added product.</p> <p>With the Kansas desire to continue to grow the livestock sector there will be opportunities to tailor feed to animals such that they can grow most efficiently in Kansas. This not only drives up overall demand for corn in Kansas but will lead to potential niche market opportunities with specific corn varieties for specific feed rations.</p>
<p>Policy Environment</p>	<p>Kansas tax law allows sales tax exemption for farm machinery and equipment and various ag-based inputs. These state tax code provisions make Kansas a more attractive state for growth or expansion.</p> <p>At the federal level, Kansas is fortunate to have elected members of Congress who strongly support the corn industry. The Kansas congressional delegation will play an important role in influencing positive changes related to federal regulations or legislation, international trade, federal taxes, transportation rules, energy policy, natural resources and more.</p> <p>Support for policies removing barriers for ethanol competition with petroleum and higher inclusion of ethanol in regular gasoline blends is a priority.</p>

Factor	Details of Challenge
Supporting Institutional Infrastructure	<p>Kansas has a solid foundation throughout the entire corn production community. With cow-calf production and stocker operations throughout eastern and central Kansas, a robust feeding sector throughout central and western Kansas, and a strong beef processing presence, Kansas has a well-established beef production network that results in efficiency benefits to all steps in the production chain. Hogs and poultry provide a smaller but important level of additional demand.</p> <p>There are 12 dry mill ethanol plants currently in operation in Kansas, creating a market for approximately 183 million bushels of corn and sorghum.</p> <p>Kansas is also home to more than 1 billion bushels of commercial grain storage capacity to accommodate the Kansas corn crop.</p>

CHALLENGES

Although corn has been a strong sector within the Kansas agriculture industry, the following challenges may serve as barriers to achieving growth in the corn sector.

Challenge	Details of Challenge
Critical Infrastructure	<p>Port access is critical and because Kansas doesn't have a port, having the transportation infrastructure necessary to move corn to ports is critical as well. Ports on the coasts where Kansas corn would travel by rail to be transloaded onto ocean-going vessels need to be maintained such that shipping capacity isn't delayed or reduced due to aging infrastructure.</p> <p>A lack of adequate housing in rural areas compounds the issue of a shortage of agricultural workers.</p> <p>Kansas has adequate grain and liquid rail infrastructure. However, a lack of rail access in the western portion of the state requires processors to ship products across the state to be loaded onto rail at the intermodal facility or to use alternative transportation.</p>
Demand	<p>The dynamics of corn demand in Kansas, particularly in the cattle feeding sector, present some questions. Does Kansas have the capacity to meet all the needs for grain, silage, high moisture corn, DDGS? If not and if production were increased does that prevent the need for other states' product?</p>
Industry Competition	<p>Industry growth and expansion in other states may present a challenge for growth in Kansas. Capital investment in corn processing naturally follows high corn production. Kansas ranks in the top 10 corn-producing states, but so much of the crop is destined for existing feeding operations and ethanol plants that other corn users may not consider Kansas the best location for investment.</p>

Challenge	Details of Challenge
Industry Opponents	<p>There are increasing attacks on the use of genetic technology in corn production and a great debate on whether that corn is suitable for use in food both in the United States and around the world.</p> <p>Another debate centers on whether corn should be used for fuel, ethanol in particular, as opposed to food and feed. This debate intensifies in times of high corn prices such as those seen in recent years.</p> <p>There is also a negative perception of corn syrup in foods, as some some consumer groups question whether high fructose corn syrup (sugar) affects humans differently than sugar extracted from sugar cane.</p>
International Trade	<p>Regulatory approval of new seed technology around the world is important as Kansas farmers look to take advantage of the latest advancements to improve yield and meet worldwide demand. A reliance on non-science-based standards in some trade partner nations disrupts the ability of U.S. farmers to access critical international markets. What may be approved in one country isn't approved in another country and the grain handling supply chain is not equipped to keep genetic traits separated for shipment. Therefore, some technological advancements can't be sold, and farmers can't benefit from them until they receive wide approval.</p> <p>Access to international markets for corn products is key to growing the industry. Resistance to free trade agreements at the federal level can hinder this access.</p> <p>There are big export opportunities for DDGS from ethanol production. The full potential for DDGS usage in feed rations is not fully understood. Better understanding of how to use DDGS effectively in feed should lead to increased exports.</p>
Policy	<p>Renewable Fuel Standard is a regular unknown when it comes to understanding the requirements for ethanol in U.S. gasoline. More transparency and predictability would bring increased stability to the ethanol market.</p> <p>Maintaining the flexibility farmers have in how they depreciate capital purchases as it relates to federal income taxes is critical for management and planning. Any changes which reduce that flexibility or threaten to reduce it compromise farmers' ability to plan for expenses.</p> <p>Farm families work their whole lives to build and maintain the family farming operation including the acquisition of land. Being forced to sell hard-earned assets to satisfy estate taxes is a devastating blow to family farmers, particularly beginning farmers.</p> <p>Though not unique to Kansas, there exist significant challenges due to federal laws and regulations, including Waters of the U.S., the Endangered Species Act, burdensome OSHA regulations and more. The focus on atrazine by the Environmental Protection Agency is also concerning.</p> <p>There is growing concern regarding the reliance on property taxes to finance local units of government and the impact on profitability for corn farmers in times of tight margins.</p>

Challenge	Details of Challenge
Policy cont.	<p>Ethanol plants are at the center of the Kansas debate on property taxes for machinery and equipment versus permanent fixtures in manufacturing plants. A good understanding of ethanol production is important, particularly how processing tanks are used and why they should be considered equipment instead of a fixture.</p> <p>There is a shortage of drivers with a commercial driver's license (CDL). If a person has a CDL they can't cross the state line until they are 21 years old. CDL drivers that can't cross the state line have limited usefulness. Most young people looking for careers out of high school have settled on something other than truck driving by the time they turn 21.</p>
Sustainability	<p>It will be important for farmers to be able to document the proof of the sustainability of their operations going into the future as more first and second purchasers become concerned with sustainability. This is driven by consumer awareness and interest in sustainability.</p>
Water	<p>Corn production relies on ever-depleting sources of groundwater for irrigation.</p>
Workforce Development	<p>Growth in the corn sector — particularly in seed technology, ethanol processing, and irrigation research and technology — will require a skilled workforce, which continues to be a significant challenge through the entire agricultural industry.</p>

SUCCESSSES

Key successes in the corn industry:

- A biofuels infrastructure grant to Kansas for \$1.3 million is being used to improve consumer access to E15 by partnering with gas stations across the state to install pumps that can supply E15. This benefits consumers as well as producers.
- The Kansas Corn Commission, through their Seed to STEM learning opportunities provided to school teachers and other parties, are being utilized to help educate youth about GMOs. Appropriate labs are currently available related to GMOs and biotechnology for 6th-12th grade teachers, as well as training and funding specifically created to meet state science standards.
- Environmental Protection Agency Administrator Scott Pruitt visited a Kansas ethanol plant, East Kansas Agri-Energy, in June 2018 and had a conversation with corn farmers on important issues such as the Renewable Fuel Standard.
- An irrigation efficiency study has been done that looks at combining the principles of center pivot irrigation with drip irrigation to reduce the amount of irrigation water required with a typical center pivot system.
- There has been significant innovation to allow for production of diesel from corn oil.
- An intermodal facility is taking advantage of the significantly reduced freight cost of shipping containers returning to China and other Asian markets by shipping distiller's grains from Kansas into those markets in containers.

Corn

GROWTH OBJECTIVE:

Increase demand for ethanol, renewable diesel, DDGS and livestock feeding, with a focus on proactive water policy and efficient transportation infrastructure.



OUTCOMES & ACTION ITEMS

Leaders from throughout the Kansas corn industry will continue to collaborate in the development and implementation of a long-term strategic growth strategy with input and discussion among key partners. Industry-identified desired growth outcomes, initially developed in 2016 and expanded to include action items, will be implemented by industry and key partners and updated annually at the Kansas Governor's Summit on Agricultural Growth. Following are the proposed action items to continue building on the achievement of the corn sector desired outcomes.

High Priority Outcomes

50 percent of Kansas fuel stations with readily available E15. Utilizing the U.S. Department of Agriculture Biofuels Infrastructure Partnership grant reduces the financial burden for stations to offer E15.

ACTION ITEMS:

- Continue utilizing the USDA Biofuels Infrastructure grant to reduce the financial burden for stations upgrading to pumps that offer E15.
- Continue working with USDA, Prime the Pump, and Kansas Corn Commission programs for additional funding to make necessary conversions at retail locations to ensure that funding comes from public/private partnerships.
- Support work in the Kansas City Metro Area to obtain a 1lb. waiver of the Reid Vapor Pressure standards to allow E15 to be sold year-round.
- Enlist the KDA weights and measures fuel program data to annually measure and report the percentage of stations offering E15.
- Educate consumers about the benefits of purchasing E15.
- Develop a consumer-driven message about why not to fear utilizing E15 (e.g., What vehicles can use it? Where can you get it?)
- Encourage petroleum marketers to use E15 availability as a customer draw.
- Work with wholesale terminals to offer E15 rather than all the blending being done at the station.
- Support removal of unjust regulatory barriers and push for strong administrative support of programming by USDA.

Distiller's dried grains with solubles (DDGS) as a widely used feed ration both domestically and internationally. Education on the international level is important for continued adoption of DDGS as a feed ingredient.

ACTION ITEMS:

- Support federal trade policies that foster free and open trade and the reduction or removal of tariffs that hinder the export of DDGS.
- Work with industry partners (Kansas Corn Commission, Kansas Corn Growers, Renew Kansas, Kansas Feed & Grain Association, U.S. Grains Council, U.S. Meat Export Federation, etc.) to emphasize DDGS during both inbound and outbound state and federal trade missions, as well as align educational and promotional efforts.
- Educate on the international level to encourage continued adoption of DDGS as a feed ingredient through participation in international trade missions.
- Develop a plan for targeting those countries around the world with growth potential in the use of DDGS in feed rations.
- Encourage expansion of ethanol production and assist with new technology adoption for DDGS-based products.
- Research how to feasibly dry and transport distiller's grains to both increase market and provide value.

Clear, factual information about genetic engineering, or genetically modified organisms (GMOs) easily available to consumers. The industry needs to focus on the need for GMOs to meet demand as well as increase yields while using less water and pesticides and maintaining the positive impact corn has on the Kansas economy.

ACTION ITEMS:

- Ensure information available is scientifically based, but consumer focused, and provided through a partnership with the Kansas Corn Commission, Kansas Foundation for Ag in the Classroom, K-State Research and Extension, and other shareholders.
- Use the Center for Food Integrity or other research organization to help determine a percentage of consumer acceptance. This includes completing a study of the “general” consumer and what their attitudes and preferences are towards GMOS.
- Emphasize the importance of GMO products and highlight difference in false labeling claims at both the state and federal legislative levels.
- Ensure this message is clear in Kansas Foundation for Ag in the Classroom materials.
- Hit the highlights during Ag Month, harvest releases, speaking engagements, etc.
- Coordinate with agricultural industry organizations to continue social and traditional media outreach about corn production, safety, quality and nutrition.
- Use “GMO Answers” as a customer-facing education piece.
- Develop better relations with school teachers and dieticians and give them the tools they need to help educate youth about GMOs.
- Celebrate biotechnology as an industry.

Implementation of action items in the *Vision for the Future of Water Supply in Kansas* related to the corn industry, leading to a longer usable life for Kansas groundwater and surface water sources. Effective adoption of conservation practices and management efforts which support more flexible water policies, better opportunities for voluntary conservation and increased research on management practices.

ACTION ITEMS:

- Promote the sustainable use of the Ogallala Aquifer through irrigation technology, drought-resistant crop varieties, soil moisture testing, and enhanced soil health (cover crops, no-till, etc.).
- Coordinate with Groundwater Management Districts, Kansas Water Office, KDA, KSRE, and additional partners to preserve water for future use.
- Research cost-sharing of technology adoption.
- Coordinate with USDA Risk Management Agency to address crop insurance policies that disincentivize water conservation, such as limited irrigation.
- Determine optimum plant development stages for most efficient water application opportunities by collaborating with the seed industry, Kansas State University, crop consultants and others.
- Collaborate with crop consultants and other agricultural advisors to support farmers interested in less water-intensive alternative crop production in coordination with corn.
- Partner with and support public and private entities focused on development of drought-resistant corn and related advancements.
- Implement research to increase drought-resistant corn production.
- Develop recommendations based on research related to corn and cotton rotations.
- Take into consideration the conservation that has been done when developing new conservation incentives and programs.
- Use public money to support the Vision for the Future of Water Supply in Kansas.
- Restore water plan funding for projects related to water education and outreach.
- Have locally led conservation districts be at the forefront of planning for soil and water conservation and other natural resources for the state of Kansas.

Improved corn yields in Kansas from better crop technology, better irrigation technology and evolving management practices.

ACTION ITEMS:

- Drive development and adoption of technology by bringing together equipment manufacturers, KSRE, KDA, resource districts, etc.
- Research cost-share programs to be offered to incentivize efficient water use.
- Build case studies and education around return on investment of technology.
- Promote irrigation scheduling.
- Provide local and regional certification for growers related to irrigation management.
- Offer a degree in irrigation engineering or groundwater management at K-State.
- Support water technology farms looking at irrigation practices applicable to corn production.
- Designate corn checkoff dollars to fund research gaps between what is currently being done by seed companies and the needs of the industry.
- Identify someone at K-State with a full-time focus on corn.
- Accelerate the release of varieties (drought tolerance, low mycotoxin susceptibility) through collaboration with international efforts focused on the same.
- Establish regional benchmarking, benchmarking by soil types and similar climate/rainfall area to allow growers to learn from top producers.

Medium Priority Outcomes

Increased amount of Kansas corn processed with value added in Kansas.

ACTION ITEMS:

- Partner in executing the food processing growth strategy.
- Partner in executing the pet food growth strategy.
- Partner in executing the feed and forage growth strategy.
- Target corn specialty traits that are Kansas specific or could benefit Kansas industries or processes.
- Focus research on opportunities to add value with corn.
- Increase grain-based pet food production in Kansas.
- Recruit industrial chemical production such as biobutanols.
- Recruit more distilleries.

Simplified permitting requirements for farm vehicles, and transportation regulations that provide flexibility to requirements for commercial driver's licenses (CDLs) to ensure that corn is able to move safely and efficiently throughout the state.

ACTION ITEMS:

- Consider an in-state option for lowering the age requirement if federal rules stand in the way.
- Create a list of military discharge placement services in Kansas.
- Connect Kansas truck driving school to placement services for potential students.
- Streamline the information from Kansas Corporation Commission, Kansas Highway Patrol and Kansas Department of Transportation.

Regulations based on sound science and supportive of business success, particularly in regard to Environmental Protection Agency regulations and issues important to the Kansas corn sector such as Waters of the U.S. (WOTUS), atrazine levels of concern and the renewable fuel standard.

ACTION ITEMS:

- Meet regularly with industry to stay connected on regulatory issues.
- Engage with the EPA on issues important to the corn sector.
- Engage Governor, Attorney General and congressional delegation to further the Kansas position as needed.
- Continue to meet with federal EPA leadership.
- Increase farmer involvement with the EPA in regard to crop protection chemicals.
- Help the EPA recognize the carbon footprint of corn ethanol production as an advanced biofuel.