

CORN

EXECUTIVE SUMMARY

The Kansas corn industry fills a significant role in the agriculture economy, and 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 supplying feedstock for ethanol and, thus, ethanol byproducts. 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 major 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 more potential for corn to contribute to additional products and bring additional manufacturing options to the state.

A number of challenges face the corn industry and present potential barriers to future growth within this sector. A number of 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 internationally question the role of genetic technology in corn production and in fuel use, as well as nutritional issues. Ever-depleting groundwater sources for irrigation continues 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 increased 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 566 million bushels in 2014 that contributed to a total economic output for the corn sector of \$3.71 billion and 13,000 jobs. 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 95.5 million bushels were exported from Kansas in 2014. Kansas ranks 9th 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. The ethanol industry, a primary supporter of the corn industry in Kansas, provides an added 1,889 in total jobs, as well as a total economic contribution of over \$1.0 billion.

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 \$2.1 billion and creates 3,876 jobs in the state. Through indirect and induced impacts, the industry supports a total of 13,000 jobs and provides a total economic contribution of nearly \$3.7 billion. The ethanol industry, a primary supporter of the corn industry in Kansas, provides an added 1,889 in total jobs, as well as a total economic contribution of over \$1.0 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. One of the key geographic challenges is the amount of rainfall received so in many areas irrigation is used for corn production. Irrigation is a critical component to allowing the quantity of corn production the Kansas economy demands particularly in the areas of high feed demand. 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 increasing 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 around the world. 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, although close study reveals that ethanol DDGS continue to provide a viable feed source after 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 soil health, management to weather, incorporating big data into 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 more markets around the world. Further, increased efficiency in the regulatory approval of genetically engineered corn globally would allow new technology to come into play sooner in Kansas so that corn produced 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
Alternative Uses and Bioscience Business Development	<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 such as corn flakes and 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, workforce assistance, and more.</p>
Big Data Use	<p>As more and more data becomes available related to cropping systems there are more opportunities to use the data to improve profit margins for corn, thereby increasing its economic impact and the number of farmers interested in producing corn.</p>
Ethanol	<p>Expansion of ethanol capacity will create additional demand for Kansas corn in addition to the economic impact in rural Kansas of more capital investment and job creation.</p> <p>Making sure corn ethanol is strongly included in the Renewable Fuel Standard and initiatives such as Prime the Pump and the U.S. Department of Agriculture's biofuel availability grant will build demand for ethanol by increasing consumer access to E15 and E85.</p>
Export Infrastructure	<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>
Genetic Advancements	<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 central and western Kansas without significant yield loss. This would increase the number of acres on which corn can be produced.</p>

OPPORTUNITIES (cont'd)

Factor	Implications for Growth and Development Opportunities
Genetic Advancements (cont'd)	<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 uses 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. Would the market support varieties suited for specific livestock such as beef, swine or poultry? Could specific varieties increase yield in ethanol plants?</p>
Irrigation Technology	<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 of achieving the same economic return with less water. Being more efficient with irrigation system in terms of water use will help reduce water use and potentially pumping costs while maintaining good yields.</p>
Land Availability	<p>Kansas has the second most farm land of any state, roughly 90 percent devoted to agriculture.</p>
Leadership	<p>Kansas is home to strong leadership in the corn sector, creating additional investment opportunities.</p>
Livestock Feeding	<p>Kansas is a top 3 state in cattle production and top 10 in hogs. 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>

OPPORTUNITIES (cont'd)

Factor	Implications for Growth and Development Opportunities
<p>Policy Environment</p>	<p>Recent changes to the Kansas tax code have reduced state tax burdens on the Kansas agricultural community. Some of the key changes include a state income tax exemption for partnerships, LLCs, Limited Liability Partnerships, Sole Proprietorships and Subchapter-S Corporations and a 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>The Kansas agriculture community is active in discussions with state transportation officials about the possibility of increased truck weights allowing for more efficient movement of agriculture products.</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>
<p>Supporting Institutional Infrastructure</p>	<p>Kansas has a solid foundation throughout the entire corn production community. With cow-calf production and stocker operations throughout eastern and central Kansas and 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 and strong demand for corn. Hogs provide a smaller but important level of demand and the growing poultry industry will provide more 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>

SUCCESS STORIES

Key successes in the industry include:

- An irrigation efficiency study 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.
- A biofuels infrastructure grant to Kansas for \$1.3 million that is being used to improve consumer access to E15 by partnering with gas stations across the state to install pumps that can supply E15.
- The 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.
- Innovation to produce diesel from corn oil.
- Changes in the tax code (see above) in 2014.

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
<p>Critical Infrastructure</p>	<p>Port access is critical and because Kansas doesn't have a port, having the transportation infrastructure necessary to move corn to the port is critical as well. Ports such as the Port of Catoosa in Oklahoma where Kansas corn is loaded on barges need to be maintained such that shipping capacity isn't delayed or reduced due to aging infrastructure. The same applies to ports on the coasts where Kansas corn would travel by rail or barge to be transloaded onto ocean-going vessels.</p> <p>A lack of adequate housing in rural areas compounds the issue of a shortage of agricultural workers mentioned above.</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 use alternative transportation.</p>
<p>Demand</p>	<p>Need to better understand the dynamics of corn demand in Kansas particularly in the cattle feeding sector. Does Kansas have the capacity to meet all the needs for grain, silage, high moisture corn, DDGS? If not and production was increased does that prevent the need for other states' product?</p>
<p>Industry Competition</p>	<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>
<p>Industry Opponents</p>	<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. 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 from some consumer groups and debate about whether high fructose corn syrup (sugar) affects humans differently than sugar extracted from sugar cane.</p>

CHALLENGES (cont'd)

Challenge	Details of Challenge
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 US, the Endangered Species Act, burdensome OSHA regulations and more. The current focus on atrazine by the EPA 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> <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>

CHALLENGES (cont'd)

Challenge	Details of Challenge
Sustainability	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.
Water	Corn production relies on ever-depleting sources of groundwater for irrigation.
Workforce Development	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.

NEXT STEPS IN STRATEGIC DEVELOPMENT

The development of a long-term growth strategy will require input and discussion among key partners. The following strategies have been identified as next steps in developing a strategic growth plan for the corn sector.

Focus Area	Solution
Big Data Management	Farmers and agribusinesses are currently picking the pieces of technology that work for them with very few taking full advantage. Better knowledge transfer is needed from early adopters to everyday users.
Business Development	Steps to encourage business development in this sector could include the following: <ul style="list-style-type: none"> • Pursue the creation of economic development programs applicable to the corn support, production and processing industries. • Pursue the creation of programs that provide training to start-ups on interfacing with the investment community. • Create a marketing program that promotes Kansas as the place for corn research, input and processing companies.
Federal Policies	Continue to monitor and take appropriate action on policies that could adversely affect the corn industry such as Waters of the U.S., Endangered Species Act, OSHA regulations, etc.

NEXT STEPS IN STRATEGIC DEVELOPMENT (cont'd)

Focus Area	Solution
Industry Outreach	<p>KDA will identify potential partners and establish a schedule for strategic growth plan meetings. KDA will also proactively reach out to key industry leaders and major processors in Kansas regarding the development of a strategic growth plan.</p> <p>KDA will dedicate staff time to encourage processing and logistical facilities to add value to corn within the state.</p>
Irrigation Research	<p>Continue to push the envelope on what's possible in the realm of irrigation technology to increase efficient delivery of water to corn plants. Use the momentum and action items of the <i>Vision for the Future of Water Supply in Kansas</i> to ensure effective prioritization of irrigation research. Work with K-State to establish a degree program in irrigation engineering.</p>
Water	<p>Continue implementation of the action items identified in the Kansas Water Vision, including continued outreach related to increased adoption of voluntary, flexible water conservation tools like Water Conservation Areas and Local Enhanced Management Areas. Work with K-State to implement area groundwater specialists in the Cooperative Extension Service.</p>

OPPORTUNITIES TO EXPAND PRESENCE

An initial list of potential opportunities includes:

- Increase livestock feeding.
- Increase ethanol production.
- Increase ethanol exports particularly to Mexico where Kansas has a logistics advantage versus other ethanol producing states.
- Go after emerging technology companies utilizing corn such things as corn-based chemicals.
- Increase corn production.
- Partnership between ethanol processors and feed companies to enhance the feed value of DDGS.
- Increase ethanol percentage in gasoline, i.e. E15 and up.
- Increased fuel efficiency standards will lead to smaller engines with turbo chargers for increased power which require higher octane. Ethanol is a great source of octane.
- Kansas should consider tax credits for blender pump installation at gas stations to help increase ethanol usage.
- Expand the value add at ethanol plants — renewable diesel, feed value enhanced DDGS, etc. Much more likely way of bringing increased value to Kansas from ethanol than expanding ethanol production.

OBJECTIVE

Based on feedback and information gathered from stakeholders and key partners at the Agricultural Growth Summit in August 2016, specific growth objectives for the Kansas corn industry will be developed.

Kansas AG SUMMIT

GROW SMARTER. GROW STRONGER. GROW KANSAS.

KANSAS STRATEGIC AGRICULTURAL GROWTH CORN — NOTES

MEETING SUMMARY

From April to July 2016, Kansas Department of Agriculture executive and agricultural marketing team members met with corn producers, industry representatives and ethanol producers. Producers identified for the one-on-one conversations represented both small and large operations and ranged in geography throughout the state. Many expressed that livestock feeding, ethanol production and transportation logistics make Kansas a good place to grow. Common themes of challenges impacting the growth of the corn industry in the state included regulatory issues against the industry and the current lack of approval of higher ethanol blends.

Consumer Corn

- Next big corn demand may include diversity in how corn is raised (potential increase in organic, etc.)
- Being able to document sustainability will be critical moving forward

Ethanol

- Food safety would have to be improved in order to use distillers in pet food
- Improved export markets for DDGS could reduce large price swings
- Bushel demand is largely based on livestock and ethanol
- Global market doesn't fully understand how distillers can be used as a feed source
- Need to promote use of distiller's grains in Kansas cattle feeding and exports
- Corn, petroleum and supply/demand all drive ethanol price
- Bio-refinery helps diversify and build longer lasting demand
- Currently too much production vs. ethanol demand (need more domestic demand)
 - Nobody knows why they should use ethanol
- Export market is vital to the industry, but not all Kansas plants are well positioned for exporting
 - Development in Mexico may be a big advantage for Kansas
- Better Blends Initiative is good for the industry and needs more promotion to consumers
- Need to help consumers see the connection between higher ethanol percentage and higher octane

Corn



Finance and Capital

Corn

- Family selling inherited land is a challenge
 - Need a way to transition non-farm relatives without having to sell

Ethanol

- Financing can be difficult
 - Market would say ethanol is a poor investment
 - Many ag lenders are not comfortable with biofuels

Research

Corn

- Need more knowledge on dynamics of corn use in some areas of the state
 - Partnering on a survey with KDA would be beneficial
- Big data provides a lot of information that producers can use to their advantage
 - Do producers know how to use it? (to full potential)
- Need an effective method for knowledge transfer to all producers from early adopters
- Storage beetle found in Vietnam distiller's being researched for any potential harm in the U.S.
- Need to continue to look at value-added processing for by-products
- Partnering with feed companies to further enhance nutrition would be beneficial

Ethanol

- Promoting bio-innovation in Kansas would be beneficial (Bio Kansas Organization, research support, etc.)
- Employing petroleum refining techniques could be beneficial (could use more connection between ethanol and petroleum)

Rules & Regulations

Corn

- Regulatory challenges against the industry such as EPA rules regarding Waters of the U.S. and Atrazine are a concern
 - MOVES model is a primary concern
- Property tax could become a big problem (cost climbing)
 - Rent will be an issue moving forward

Ethanol

- Approval of higher ethanol blends is critical
 - Number one issue for ethanol — beyond E15, E85 is part of it
- Federal grant process through USDA process is slow, but the people in Kansas are great to work with

- Would like to see the state more supportive of Renewable Fuel Standards, but recognize the need to move beyond that
- Ethanol plant property tax challenge
 - Most plants received a 10-year tax abatement for construction, plants are starting to come off of abatement
 - Need uniform classifications
- Taxing processing tanks as property vs. equipment is a big challenge for the industry due in significantly increased cost
 - PVD working on an ethanol plant guide in cooperation with industry
- A tax credit for installing blender pumps would be beneficial (property tax and/or income tax credit)
- Industry asks for no new taxes on ethanol (like the severance tax proposed in 2015)
- Needs more support from the state on ethanol

Transportation and Infrastructure

Ethanol

- Intermodal is a huge advantage for Kansas
- There is not much more room for ethanol plant in Kansas
 - Would depend on gasoline demand
 - Need for strategic market that connects to location of the plant

Water and Natural Resources

Corn

- Going to continue to see impact from water availability

Workforce and Quality of Life

Corn

- Need for more CDLs and truck drivers
- Next generation is here and ready to take over
 - The question: When does the older generation let them take over?

Ethanol

- Recruiting higher level management can be a struggle
- Workforce shortage in some areas of the state
- Anti-immigration is a challenge
- Need for more CDLs and truck drivers

Potential Action Items

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