# Sorghum

## Executive Summary

Kansas leads the nation in sorghum production, which is a versatile, efficient, multiuse crop well suited for Kansas agriculture for many reasons. Sorghum is among the most efficient crops in conversion of solar energy and use of water, and is very drought tolerant. Grain sorghum has traditionally been used for livestock feed and in the production of ethanol, both in the U.S. and in international markets. Sorghum is also gaining popularity in food products as a gluten-free substitute for other grains, and in the production of beverages and syrup as well as in pet food products. State and national sorghum advocacy organizations provide strong leadership in the promotion of sorghum domestically and worldwide. Ongoing research is creating even more possibilities for the sorghum industry.

Although sorghum's advantages are numerous, some challenges still exist as barriers to realizing sorghum's full potential. The export market is a significant part of the sorghum industry, with the majority going to China; the stability of the China market for grain sorghum is unknown. Costs associated with transportation, particularly internationally, can be burdensome to producers. Human food-grade sorghum remains a very small percent of Kansas sorghum production, which means it receives less focus within the market, although potential is high in that area.

A long-term growth strategy to expand the impact of sorghum in Kansas will rely on input and discussion among key partners in the industry. A centralized large-scale research center would promote innovations for all segments of the sorghum industry, and additional research partnerships would be key. Statewide support for producers within the sorghum sector would be welcome. Overall, collaboration between public and private stakeholders within the sorghum industry is important in the development of a strategic growth plan.

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# STATUS

Sorghum — a grain, forage or sugar crop –— is among the most efficient crops in conversion of solar energy and use of water. Sorghum is known as a high-energy, drought-tolerant crop. According to the National Sorghum Producers, grain sorghum has traditionally been used for livestock feed and in a growing number of ethanol plants. Sorghum produces the same amount of ethanol per bushel as comparable feedstocks and uses one third less water. In the livestock market, sorghum is used in the poultry, beef and pork industries. Stems and foliage are used for green chop, hay, silage and pasture. A significant amount of U.S. sorghum is also exported to international markets where it is used for animal feed, ethanol and other uses.

In the United States, 7.1 million acres of sorghum were planted in 2014. Of the 21 sorghum-producing states, Kansas ranks first followed by Texas, Colorado, Oklahoma and Nebraska. These states are included in the Sorghum Belt, an area from South Dakota to South Texas that offers a quality dryland growth opportunity.

According to estimates prepared by the Kansas Department of Agriculture and based on the Implan economic data model, the sorghum industry in Kansas has a direct output of approximately $681.7 million and creates 1,392.4 jobs in the state. Through indirect and induced impacts, the industry supports a total of 4,233.1 jobs and creates a total economic contribution of nearly $1.17 billion.

Sorghum is also gaining popularity in food products in the U.S. because of its gluten-free food and non-GMO properties. Sorghum is a suitable substitute for wheat, rye and barley for those who cannot tolerate gluten. Sorghum is used to make both leavened and unleavened breads. In Sahelian Africa, it is primarily used in couscous. Various fermented and unfermented beverages are made from sorghum. It can be steamed or popped and is consumed as a fresh vegetable in some areas of the world. Syrup can also be made from sweet sorghum.

# OPPORTUNITIES

In order to develop a strategic growth plan for the sorghum 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 |
|---|---|
| **Acreage** | Nationally, the total number of sorghum acres harvested annually is still low in comparison to other commodities (wheat, corn, soybeans). Increasing market share will draw more attention to sorghum and sorghum by-products. |
| **Industry Leadership** | Kansas has strong leadership on the state (Kansas Grain Sorghum Commission and Kansas Grain Sorghum Producers Association) and national (National Sorghum Producers and United Sorghum Checkoff Board) levels. One can deduce that Kansas is in a positive situation when considering votes needed to allocate funds for market development, renewable research proposals and crop improvement projects. |

# OPPORTUNITIES

| Factor | Implications for Growth and Development Opportunities |
|---|---|
| **Industry Research** | Kansas State University scientists are currently working to understand how to most efficiently use nitrogen in sorghum. K-State also researches best management practices for over-top herbicides that can be put on fields. A research hub with K-State and industry — similar to the Wheat Genetics Research Center — would effectively centralize and enhance this research.<br><br>In April 2016, the Sorghum Checkoff, Kansas Grain Sorghum Commission, and K-State announced a cooperative agreement to increase grain sorghum productivity and expand markets by 2025. This partnership creating the Center for Sorghum Improvement will provide funding for long-term research and the development of marketplaces, attributes, qualities and other factors capable of increasing demand for sorghum bushels. |
| **Industry Value** | Value is virtually equal to corn for ethanol and livestock feeding, both of which are big markets in Kansas. |
| **Marketing** | Developing new markets for sorghum as livestock and ethanol feedstock is key to strengthening demand. In the livestock industry, dairies and cattle feedlots — two animal sectors plentiful to the state — are major consumers of domestic sorghum. Globally, China imports Kansas sorghum to fulfill poultry and pork feed needs.<br><br>The domestic ethanol industry is volatile as supply/demand/pricing and distribution challenges arise. The U.S. Grains Council recently adopted ethanol as a new focus commodity, and the council has identified — in partnership with the U.S. Department of Agriculture's Foreign Agriculture Service and Renewable Fuels Association — an ethanol export promotion strategy for Southeast Asia, Peru, Panama, Japan and Korea.<br><br>Branded products for both animal and human consumption are being embraced by the everyday consumer. Not to be overlooked, the pet food industry is utilizing sorghum in their products, too. Sorghum provides a cost competitive and nutritious ingredient for pet food companies who are using grain for carbohydrate blends. Sorghum is on the cusp of creating a permanent home in the niche-food sector. |
| **Value-Added Product** | While sorghum has historically been used for livestock feed, ethanol production and exports, it is gaining popularity as a food and pet food product because of its nutritional, gluten-free and non-GMO properties. Marketing efforts like simplysorghum.com are educating consumers on ways to incorporate food-grade, value-added sorghum into everyday living. |

# OPPORTUNITIES

| Factor | Implications for Growth and Development Opportunities |
|---|---|
| **Water** | Research findings indicate sorghum is a less water intensive crop with dryland success. |

# SUCCESS STORIES

The following are a few notable success stories in the sorghum sector:

- Governor Sam Brownback has supported a funding partnership with K-State and industry to establish a sorghum research hub.
- An industry task force gave KDA two very specific objectives to help work toward: breeding research and limited water situation extension expertise.
- Sorghum has established a vibrant export market into China, mostly for poultry and pork feed.

# CHALLENGES

While Kansas is poised for major expansion in the sorghum sector, the following factors represent challenges serving as barriers to achieving the objective of the strategic growth plan.

| Challenge | Details of Challenge |
|---|---|
| **Critical Infrastructure** | The costs associated with transportation and logistics is a burden for producers. In-state freight rates add expenses when distributing sorghum domestically and internationally. |
| **Industry Market** | Sorghum is naturally a non-GMO grain. It is not known whether the supply chain pricing can support dedicated market outlets for GMO and non-GMO products. |
| **International Trade** | China continues to be the number one importer of sorghum grown in the United States. The Chinese government maintains interest in domestic grain supplies by controlling pricing and access to markets. The long-term stability of the Chinese market as an outlet for Kansas sorghum is largely unknown at this time. |
| **Policy** | The National Resources Conservation Service programs do not always fit the needs of sorghum producers. |
| **Value-Added Products** | Human food grade sorghum projects make up a very small percent of overall Kansas sorghum acreage harvested. As a result, little attention and few research dollars are allocated for human-grade product development. |

# CHALLENGES

| Challenge | Details of Challenge |
|---|---|
| **Workforce** | Lack of skilled agriculture workforce is a top inhibitor of growth and expansion for many Kansas agriculture entities. |

# NEXT STEPS IN STRATEGIC DEVELOPMENT

Leaders from throughout the Kansas sorghum 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, will be implemented by industry and key partners and updated annually at the Kansas Governor's Summit on Agricultural Growth.

# SORGHUM INDUSTRY OUTCOMES

**Growth Objective:**
*Expand research partnerships and strengthen Kansas' position as the top sorghum-producing state in the nation.*

**The following outcomes will be the result of industry collaboration and effort to grow the Kansas sorghum industry:**

## Phase 1 (Begin within two years)

- Checkoff dollar funding directed toward supporting value-added education, marketing and research. These value-added sectors would include biofuels, pet food, plastics and/or human-food grade sorghum.
- Livestock feed research partnerships with Kansas State University that support the use of sorghum across Kansas agriculture sectors. These research application sectors would focus on beef cattle, dairy cattle, distiller's grains, pet food, poultry and swine.
- Implementation of action items in the *Vision for the Future of Water Supply in Kansas* related to sorghum, and expanded awareness of sorghum's water use efficiency, leading to a longer usable life for Kansas groundwater and surface water sources.
- Expanded education and outreach opportunities that support the industry's strategic growth plan.
- Expansion of in-bound and out-bound trade missions showcasing feed and value-added market opportunities.
- Transportation network — including transload facilities and container load/ship — that maximizes logistical efficiencies and minimizes costs per producer to ship sorghum domestically and internationally.
- Identity preserved sorghum for customers around the world. This can be achieved by capitalizing on the avail ability of shipping containers to ship identity preserved sorghum from the point of filling the container to the point of delivery.
- Increased truck weights on state highways, specifically going to 90,000 pounds on six axles, to maximize efficient movement of sorghum and reduce environmental impact.

## Phase 2 (Begin within 2-4 years)

- Long-term strategic plan to support the newly established Collaborative Sorghum Investment Program to include key private partners and public investment that benefit the sorghum industry and state.

## Items for further consideration

- Harvest time weight exemption for trucks hauling sorghum. It is difficult to monitor weights on trucks going directly from the field to the delivery point. This flow needs to be as efficient as possible and an exemption from weight limits for period of time around harvest would help with efficiency.