USDA Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

A report summary from the Economic Research Service *April 2025*

Demand for Alternative Feed Grains for Broiler Production in an Era of Global Price Uncertainty: The Case of Sorghum

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What Is the Issue?

The demand for chicken meat is expected to grow considerably due to urbanization, income, and population growth, especially in developing and emerging economies. This increase in demand means that there will likely be a corresponding increase in feed demand. For major exporting countries of feedstuffs (grains and oilseeds), such as the United States, this presents an opportunity to increase their share of global exports. However, the Coronavirus (COVID-19) pandemic era and the Russia-Ukraine war brought new uncertainty in feedstuff prices—especially among grains that have multiple uses, including food, biofuels, and feed. Corn and wheat prices have been especially affected and are among the commonly used grains in broiler feed formulations. Understanding the price responsiveness of demand can help assess whether other grain substitutes (such as sorghum) offer a real potential for growing their share in broiler feed formulations, especially under conditions of rising feed costs and price uncertainty. This study estimates the responsiveness of risk-averse broiler producers to feed price volatility.

What Did the Study Find?

The study found a high rate of substitution between sorghum and corn, especially among risk-averse feed producers between September 2017 and June 2023, for which data on monthly prices were available for all the countries sampled. The ease of substitutability of corn for sorghum in feed formulas is easier now because of new lines of tannin-free sorghum cultivars that improved sorghum's digestibility and, therefore, its substitutability with corn in livestock feed. The results of this study show that—whenever the price of sorghum fell below that of corn and in the presence of greater price risk for corn in global markets, as occurred following the Russia-Ukraine war, risk-averse producers would shift to sorghum. Countries that strongly showed this behavior are China, the United States, Egypt, and, to some degree, Mexico.

A similar pattern of substitution is seen in sorghum for soymeal, but this pattern primarily occurred for starter -and grower-feed. Finisher feeds tended to favor more corn and soymeal proportions in this study's feed formulation results, as the focus is mostly on energy and protein at this final stage of broiler growth.

Overall, the study finds that sorghum offered a viable potential for increased use in broiler feed formulations. This could be important during times when global grain and oilseed markets are volatile, especially for some of the most common grains in feedstuffs—corn and wheat.

The United States has the potential to grow its markets for sorghum feed, especially in countries where demand for corn has rapidly grown in competition with other uses but also during times when global markets are uncertain.

How Was the Study Conducted?

The study generated pseudo-feed demand data for broiler production among 12 of the world's major producing countries. These data are based on optimal feed compositions from a least-cost feed ration linear programming model, with price-risk considerations that relied on a range of actual observed monthly prices for feed ingredients from September 2017 through June 2023, for which data were available. Two leading broiler-producing countries were selected from each of six major regions of the world: North America, South America, Africa, Europe, Southeast Asia and East Asia, and the Pacific. Pseudo-demand data were generated due to the lack of sufficient actual demand information for broiler feed among the countries selected for this study. The resulting pseudo data on feed compositions and associated costs were then used to estimate demand elasticities for the various feedstuffs, focusing on grains (corn, sorghum, wheat, and rice), dried distillers grain solubles or DDGS (a grains byproduct), and oilseeds meal (e.g., soymeal), as well as other feed additives such as fish meal. The methodology draws on an earlier paper by Beckman et al. (2011). For actual prices and other data on grains, oilseeds, and broiler production and trade, the study relied on various domestic and international sources, including USDA, International Grains Council, United Nation's statistics on trade or U.N. Comtrade, and the U.N. Food and Agricultural Organization. Country-specific sources were used from the select countries.