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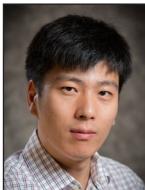
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Of maize and markets: China's new corn policy

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In early 2013, farmers in Iowa and across the Midwest braced for a difficult corn market, with prices declining from \$7/bushel in late 2012 to \$4/bushel in early 2015, and finally settling at \$3/bushel. Shielded from the world market, corn producers in China enjoyed a steady elevated corn price of almost \$10/bushel from 2011 until 2015—largely a result of China's obscure price floor corn policy. While China's corn production is mainly used for domestic consumption, policy changes in Chinese corn markets have trade implications for the global corn, beef, and pork sectors. For example, in September 2016, the United States filed a complaint with the World Trade Organization over China's excessive subsidies to corn, rice, and wheat farmers (OUSTR 2016). In this article, we will talk about why China ended its 9-year-old corn price support policy, and more importantly, what is China's new corn policy. This will be the first in a quarterly series of Ag Decision Maker articles on Chinese agriculture and Chinese economy.

China's costly corn support price program 2007–2016

Corn, wheat, rice, and soybeans are major crops in China, and Chinese farmers have been paying agricultural taxes to grow these crops for almost two thousand years. In 2004, China switched from taxing corn farmers to providing subsidies for seed and machine purchases. To further boost rural income and ensure national food security, China started a nationwide corn stockpiling program in 2007. A key feature of this policy is that the government collects corn from farmers at minimum support prices, which are typically substantially higher than market prices. This significantly distorts the market—artificially elevated support prices have enticed farmers to grow corn and sell to the state storage facilities, while rising labor costs due to the increased rural income from this support policy have kept corn prices high. Figure 1 shows historical corn futures prices in China and the United States—clearly revealing that from 2007 to 2016 China's policy drove corn prices up to two or three

times that of U.S. corn prices. It seems that China's support price program has gone through two phases: (a) from 2007 to 2010, the target support price for corn tracked closely to the corn import price plus a 65 percent out-of-quota duty; and (b) in 2011, China unveiled a fixed and extremely costly support price policy that kept futures prices

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Handbook updates

For those of you subscribing to the handbook, the following updates are included.

Farmland Value Survey (Iowa State University) – C2-70 (8 pages)

Dividing Business Income – C4-16 (3 pages)

Business Arrangements – C4-40 (2 pages)

Partnership – C4-46 (2 pages)

Corporation – C4-47 (3 pages)

Please add these files to your handbook and remove the out-of-date material.

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between \$9 to \$10/bushel for almost five years.

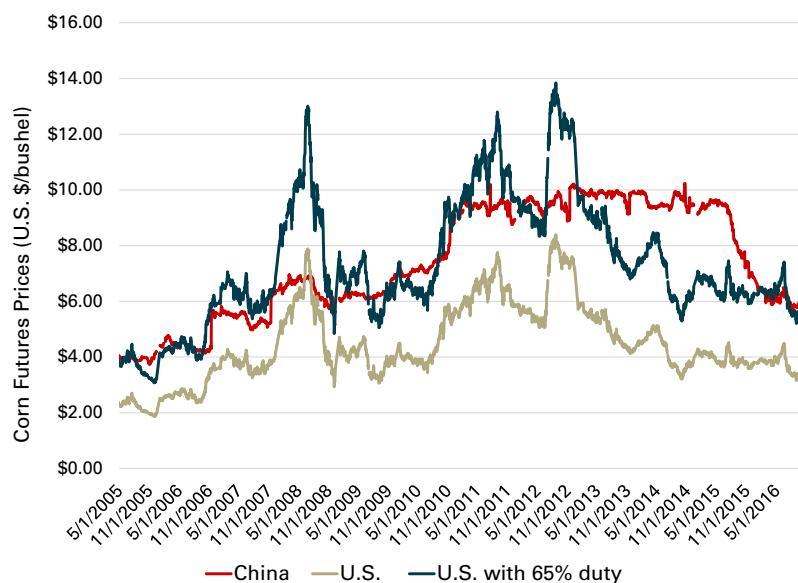
The high corn prices created incentives for Chinese farmers to produce more corn (see Figure 2). Farmers planted corn in grasslands, deserts, on mountainsides, and in marshes under the high corn price, increasing total acres to 95 million—a 26 percent increase from 2006 to 2015 (Li 2016). In 2012, corn exceeded rice in production to become China's largest grain crop (SCD 2015).

Impact of the support price policy on corn storage and financial cost

As Figure 3 shows, China's escalating corn storage is a noticeable outcome of the price support policy—China and the United States had roughly the same ending stocks in 2006/07, but in 2015/16, China's were almost double the U.S. supply. Increased storage was the intention of the Chinese government, but is more a result of excessive production, import demand triggered by the support price policy, and a lack of domestic demand. In fact, warehouses in northeastern China currently have no room to store grain. More interestingly, Chinese corn storage accumulated faster after China unveiled the \$9 to \$10/bushel fixed support prices in early 2011. By the end of 2015, China had stored enough corn for at least six months of domestic consumption. In contrast, the global average storage-to-consumption ratio is roughly 20 percent.

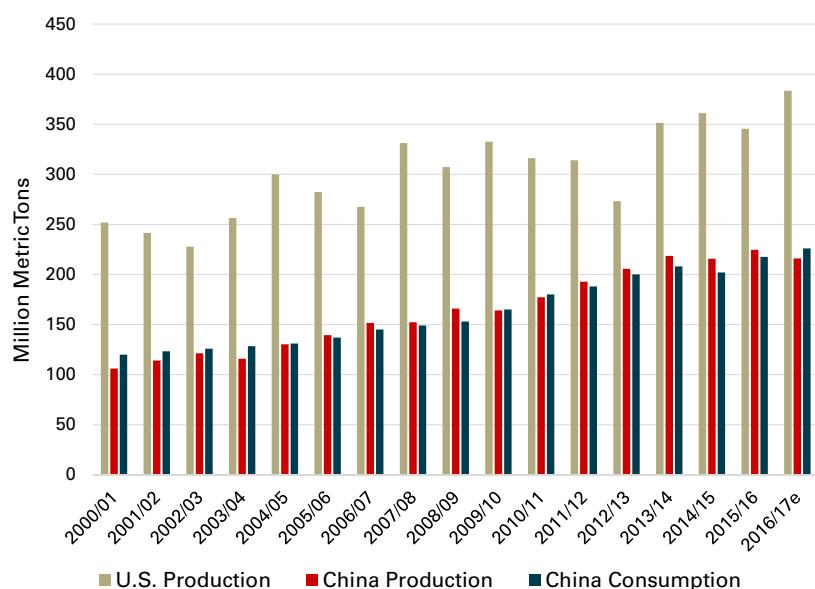
The stockpiling and support price policy has a steep price tag for China—the Chinese government faces significant financial burden due to high procurement prices. USDA estimated this policy has cost China more than \$10 billion (Ballard 2016). The price support policy also took a toll on China's aging storage facilities. In addition to corn degradation caused by structural deficiencies of warehouses, problems like mismanagement were commonplace; in fact, Chinese state television reported officials profited from selling inferior grains at new grain prices, dubbing them "rats in warehouses" (Hornby

Figure 1. China and U.S. corn futures prices, 2005–2016



Source: <https://www.quandl.com/>
Chinese November corn futures prices from Dalian Exchange, and U.S. December corn futures prices from Chicago CME Group Inc.

Figure 2. Production and consumption of corn in China and the U.S., 2000–2016



Source: USDA FAS Grain: world markets and trade

2015). Some industry analysts estimate that over 20 MMT of corn reserves are so moldy or deteriorated that they are no longer suitable for human consumption or feed use (Gale, Jewison, and Hansen 2014). Due to the huge financial and storage burden, this stockpiling program was discontinued by the Chinese government in March 2016.

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The spatial mismatch in China's corn demand and supply

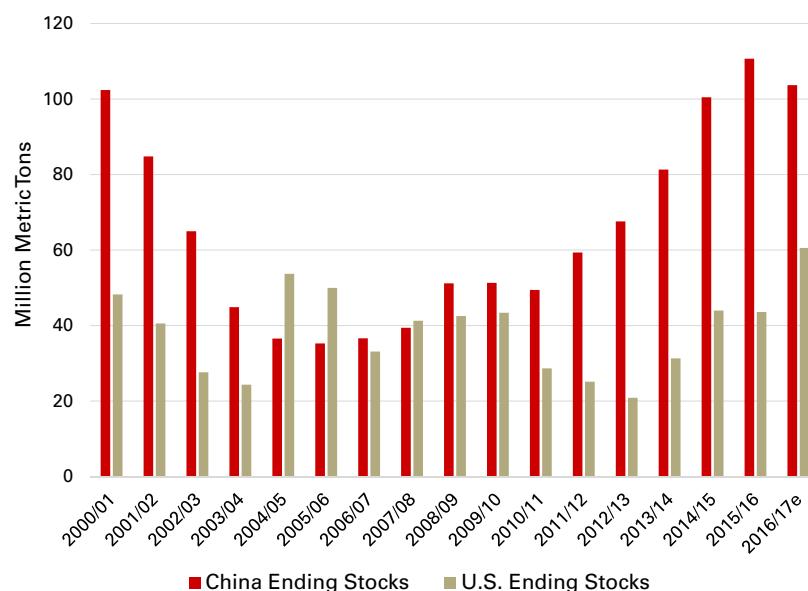
The corn support policy also led to a drop in domestic corn consumption as well as a substantial increase in the import of corn substitutes. This is due to the high domestic corn price and a spatial mismatch between where corn is grown and where it is used. As Figure 5 shows, major corn production occurs in four northeastern provinces in China, while the corn demand, proxied by leading pork production regions with at least five percent of the national pork production, is mainly located in central and southern provinces of China. Corn in China is mainly used for feed, and transportation costs from the production to consumption areas makes imported feed a cheaper alternative (Iowa Farm Bureau 2014).

In contrast, Figure 6 plots the spatial location of major corn and pork production states in the U.S. with at least three percent of the national production, and it clearly reveals that in general the U.S. corn demand, proxied by pork production, coincides well with the U.S. corn production. Iowa and other Corn Belt states, lead both the national production of corn and pork. In both China and the U.S., there are major pork production areas closer to population centers and ports, such as Guangdong in China and North Carolina. However, in the U.S., the spatial overlap in the demand and supply of corn significantly reduces the need for long-distance transportation for domestic consumption. In addition, the ethanol plants in the U.S. tend to cluster in the Corn Belt as well.

Competitiveness of Chinese domestic corn with corn imported from the U.S.

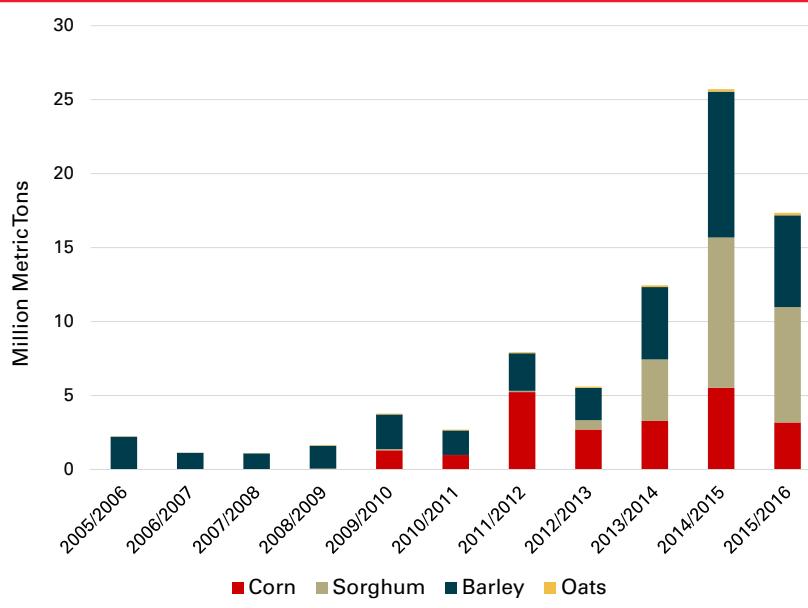
The steep corn support price drove up the cost of corn domestically produced in China for feed significantly, corn end-users in China (e.g., feed processing plants, livestock producers, bio-refineries) need to tradeoff between domestic corn and imported corn. On the one hand, corn produced in northeastern China has a steep support price plus a roughly 15 percent transportation

Figure 3. China and U.S. corn ending stocks, 2000–2016



Source: USDA FAS Grain: world markets and trade

Figure 4. China corn, sorghum, barley, and oat imports, 2005–2016



Source: USDA FAS Grain: world markets and trade

cost; on the other hand, imported corn has a 65 percent out-of-quota duty for imports beyond the quota, plus barge costs and a \$20/ton ocean transport fee. Figure 1 shows the 65 percent out-of-quota duty upon imported U.S. No. 2 corn prices, revealing that Chinese corn was still too expensive from 2013 to 2015.

As a result, massive amounts of corn and corn substitutes (sorghum, barley, DDGS, cassava chips, and

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cassava starch) were imported by China. In particular, Figure 4 reveals China's imports of corn, sorghum, and barley have more than quadrupled from 2011 to 2015 compared to low steady levels from 2005 to 2006. This is likely driven by the dramatic policy shift to a steep support price of \$9 to \$10/bushel in 2011 (Figure 1).

China's new corn subsidy program

To replace the state stockpiling program and support price policy, China adopted a direct payment corn subsidy policy tied to planted acres in spring 2016—a policy familiar to U.S. farmers. China's Ministry of Finance will allocate a 30-billion-yuan corn subsidy (\$4.51 billion) to farmers in four provinces in northeastern China, which boasts more than 60 percent of China's corn production (Patton and Hogue 2016), in the 2016/17 crop year. The payment in each county will vary depending on the ratio of funds to area planted in corn, ranging from U.S. \$109 to \$163 per acre with an average of \$137 per acre (150 yuan per mu) (Dim Sums 2016b,c).

Figure 7 compares the cost of production for benchmark corn farms in Heilongjiang Province in northeast China and Iowa from the Agri-Benchmark project. In particular, this separates the cost of production into direct costs (e.g., cost for seed, fertilizer, plant protection, irrigation, and crop insurance), operating costs (e.g., machinery cost, labor, and energy costs), and land costs. While we only have data for Chinese farms in 2012 and 2013, it shows that when Iowa farms have a total production cost around \$4 to \$5/bushel, it costs the Chinese farmers in northeast China \$7/bushel, which is roughly more than 40 percent higher than their U.S. counterparts. The soil conditions in northeast China are very similar to the “black” soils in Iowa but the lack of efficient machinery accounts for the major cost difference. After China ended the



Figure 5. Major corn and pork production provinces in China

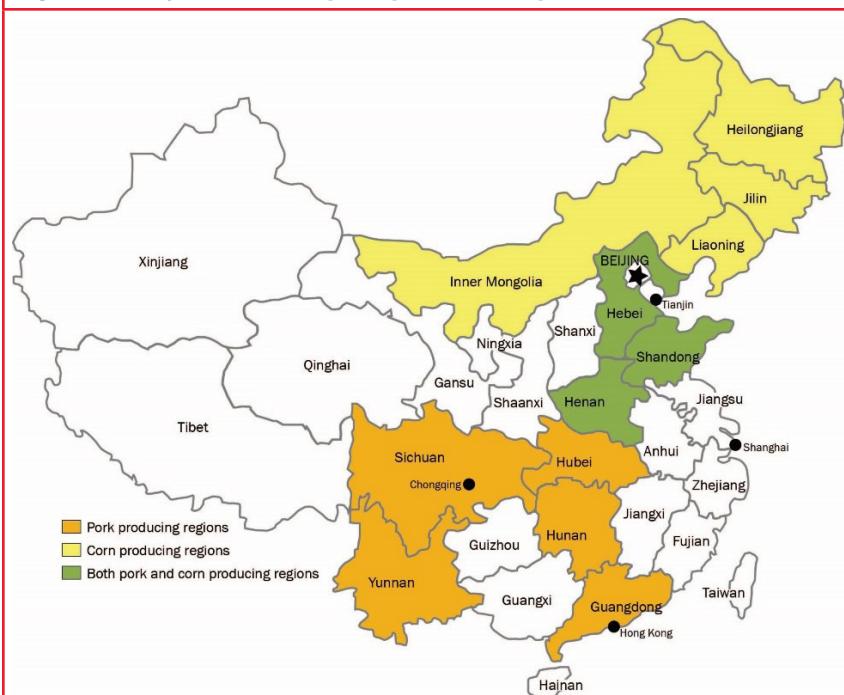
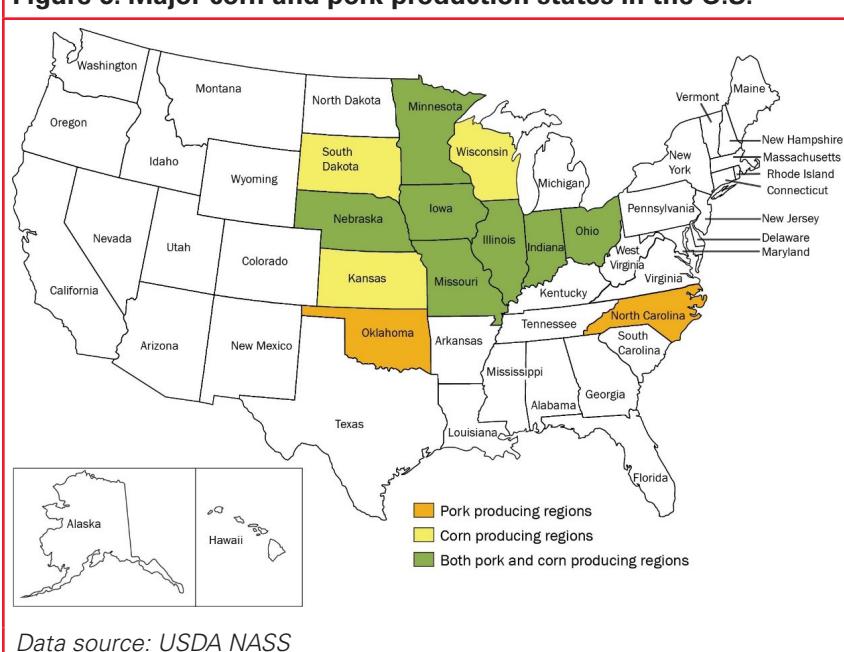


Figure 6. Major corn and pork production states in the US



support price policy, the Chinese domestic corn price is roughly the same as the effective price for corn imported from the U.S. with the 65 percent out-of-quota duty (Figure 1). As a result, currently the domestic corn produced in Northeast China could potentially account

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for a higher share used by the end-users, and the new direct subsidy could mitigate part of the gaps in the Chinese corn production cost compared with the U.S. Corn Belt cost.

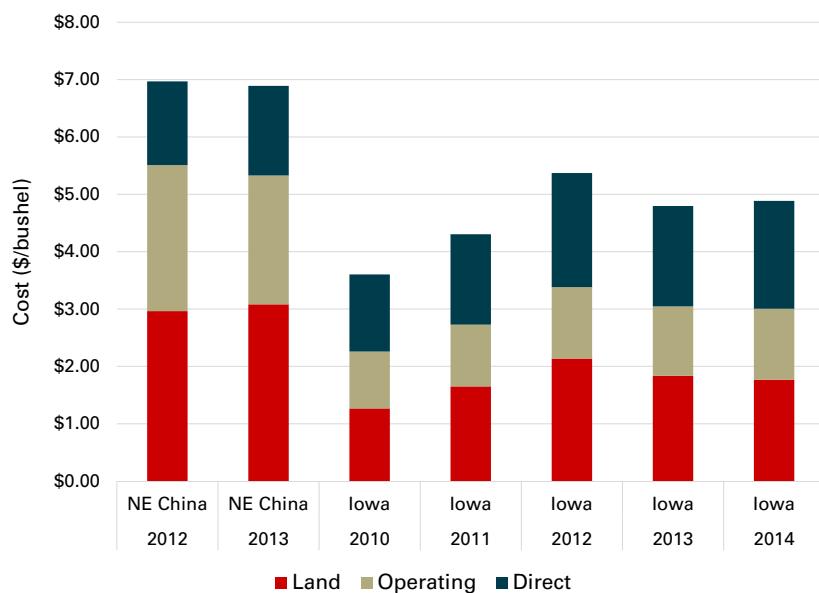
China is now also employing multiple measures to cut corn production and storage. First, the Chinese government just permitted state-owned companies to export about two million metric tons of corn to neighboring countries including Central Asia (Dim Sums 2016a). Second, China's Ministry of Agriculture is forecasting a 5-million-acre reduction in corn in 2016 due to the dramatically lower corn price, especially in fringe production areas out of the four northeast provinces (MAPRC 2015). Corn acreage is projected to drop from 93 million acres to around 86 million acres in 2018–2020 (Dim Sums 2015), and converted corn acreage is projected to go to soybeans, potatoes, other coarse grains, and fodder crops. Third, companies and interest groups have been lobbying the Chinese government to subsidize the use of stored corn for biofuel production.

Implications for U.S. agriculture

China is the largest and third-largest importer of U.S. soybeans and pork, respectively; therefore, it is critically important to assess China's corn policy and its impacts on U.S. agriculture. In the short run, it seems China will embrace a direct payment corn subsidy program, similar to what the United States adopted about two decades ago. As a measure to decrease stored corn, China is offering corn exports at lower prices than the United States and Brazil, which could potentially put a downward pressure on the global corn market. However, the poor quality of stored corn might hinder China's role in the global corn export market. In the meantime, China's imports of corn substitutes might decrease in order to encourage domestic consumption.

This year's *Document Number One*, the name given to an annual statement to emphasize the significance of agriculture by Chinese leaders in January, said for the first time that China would "carefully promote" GM food crops. In China's 13th Five-Year-Plan (2016–2020), China's State Council set R&D and commercialization of genetically modified crops as one of their priorities. However, this will not directly translate into imports

Figure 7. Cost of production for benchmark corn farms in Northeast China and Iowa



Source: Agri-benchmark Project

of GMO seeds from the U.S. since the plan implies that GMO seeds will be supplied by Chinese companies.

In the medium and long run, China is downplaying the strategic role of corn, and only regarding wheat and rice as its two main food crops, which may suggest the possibility of a transition from a target of self-sufficiency towards greater involvement in the global marketplace. As the Chinese people demand more pork and beef with rising per-capita income, China will likely need more corn and corn substitutes in the future. This need will be amplified with limited arable land, degrading soil quality, and an exodus of rural youth to cities. USDA projects that China will need to import significant amounts of corn—up to 22 MMT—by 2023/24 (Hansen and Gale 2014). The United States, along with Ukraine and Brazil, would likely be a major player if that were to happen.

Acknowledgement

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Updates, continued from page 1

Internet Updates

The following Information Files and Decision Tools have been updated on www.extension.iastate.edu/agdm.

Making the Transition from Conventional to Organic Production – A1-26 (Decision Tool)

Farmland Lease Annual Report – C2-06 (2 pages)

Dividing Business Income – C4-16 (Decision Tool)

Iowa Beginning Farmer Tax Credits and Loan Programs – C4-30 (2 pages)

Current Profitability

The following tools have been updated on www.extension.iastate.edu/agdm/info/outlook.html.

Corn Profitability – A1-85

Soybean Profitability – A1-86

Iowa Cash Corn and Soybean Prices – A2-11

Season Average Price Calculator – A2-15

Ethanol Profitability – D1-10

Biodiesel Profitability – D1-15

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