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# Feed Outlook

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## Corn Production Lowered for 2021/22, Raising Grain Prices

The U.S. corn production projection is lowered to 14,775 million bushels for 2021/22, due to a lower yield forecast from the National Agricultural Statistics Service's (NASS) *Crop Production* report. Tighter corn supplies reduce forecast usage for exports and feed and residual—slightly offset by higher food, seed, and industrial use. Ending stocks are projected lower for the upcoming marketing year, raising the expected season-average farm price $0.15 to $5.75 per bushel. Sorghum price projections for 2021/22 are also raised $0.15 to $6.15 per bushel, in line with higher expected corn prices.

World coarse grain production is projected lower this month for both 2020/21 and 2021/22. Brazil drives a reduction for 2020/21 corn output. For 2021/22, the changes in foreign coarse grain output are mixed by commodity, with less barley and oats, but more corn and rye grown outside the United States. Coarse grain trade is projected lower, led by Brazil and Canada, and partly offset by higher Argentine and Ukrainian exports. U.S corn export prospects are reduced for both years of 2020/21 and 2021/22. Corn imports are lowered for Iran, Mexico, Vietnam, Egypt, Japan, and South Korea among others.

Approved by USDA's World Agricultural Outlook Board

# Domestic Outlook

Michael McConnell
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## U.S. Corn Production Reduced for 2021/22 on Lower Yields

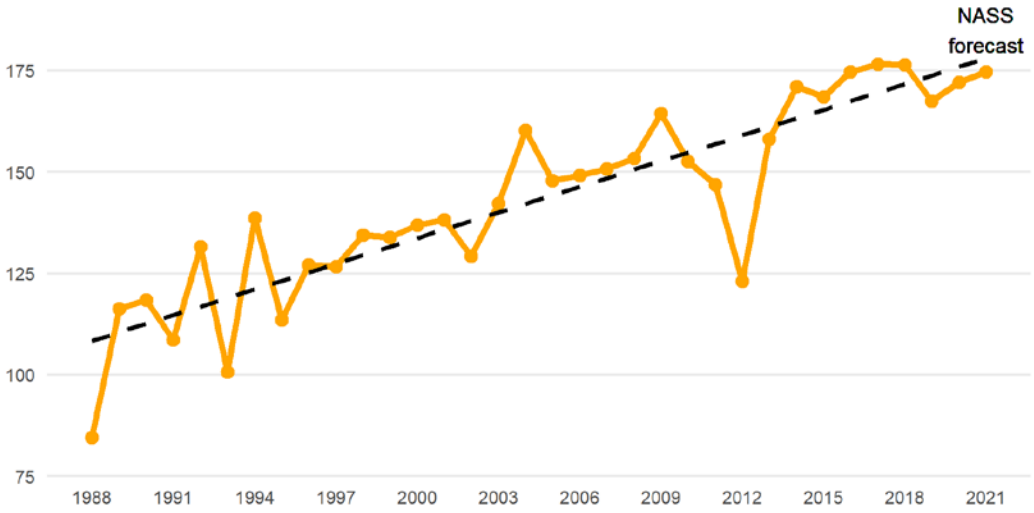
The U.S. corn market outlook for 2021/22 is for tighter supplies, pared back use, and higher prices relative to the July outlook, based on the National Agricultural Statistics Service's (NASS) August *Crop Production* report and the August *World Agricultural Supply and Demand Estimates (WASDE)*. U.S. corn production in 2021/22 is projected to be 14,750 million bushels, according to NASS's first survey-based production forecast for the crop. This is a 415-million-bushel reduction from the *WASDE's* previous production projection—which was based on NASS's harvested area forecast, published in the June *Acreage* report—and a weather-adjusted trend yield starting from 1988/89. Although lower from the previous month, the current projection is still a 4-percent increase from the previous year.

NASS forecasts the national corn yield at 174.6 bushels per acre—compared with the previous month's model-derived projection of 179.5. The current forecast is also higher than the previous year's crop yield of 172.0 bushels per acre. NASS's harvested area forecast remained unchanged from the June *Acreage* report's level of 84.5 million acres—up from the 2020/21 level of 82.5 million acres.

Figure 1

**Corn yields, United States, 1988 to 2021 projection**

Bushels per acre



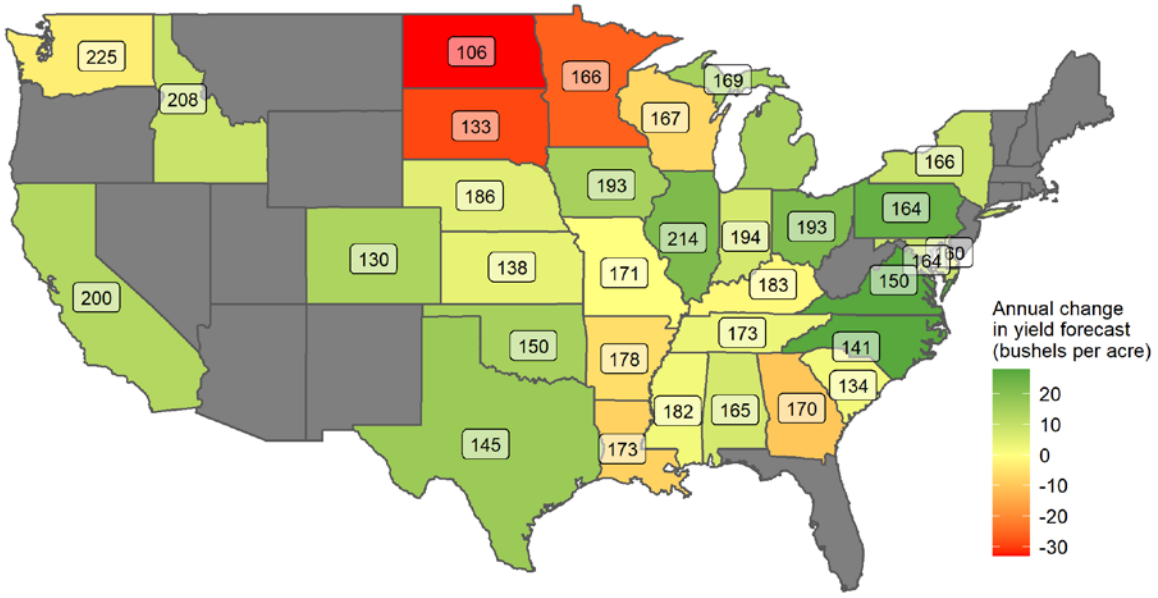

Source: USDA, National Agricultural Statistics Service.

Total supplies for 2021/22 are projected to be 15,892 million bushels—a 380-million-bushel decline from the July *WASDE*—as the lower production outlook is partially offset by higher beginning stocks, due to reductions in 2020/21 corn use. Corn imports are unchanged for 2021/22, projected to total 25 million bushels.

The NASS report illustrated the ongoing weather narrative throughout the corn-producing regions in the United States. Since the beginning of the growing season, there has been a distinct divergence in weather conditions throughout the major corn-producing States. Drought that focused in the West, Northern Plains, and extending into parts of the Western Corn Belt was contrasted with the steady precipitation (and some localized flooding) witnessed in the Eastern Corn Belt, Southern Plains, and Southeast parts of the country. NASS yield forecasts in North Dakota, South Dakota, and Minnesota demonstrate the impact of the drought in the Northern tier of the country. The yield forecast for Illinois, however, would be a State-record, if realized, at 214 bushels per acre. Record yields are also forecast for Indiana, Ohio, Michigan, New York, Pennsylvania, Oklahoma, and California.

Figure 2

**U.S. corn yield 2021 crop marketing year forecast and annual change, bushels per acre**

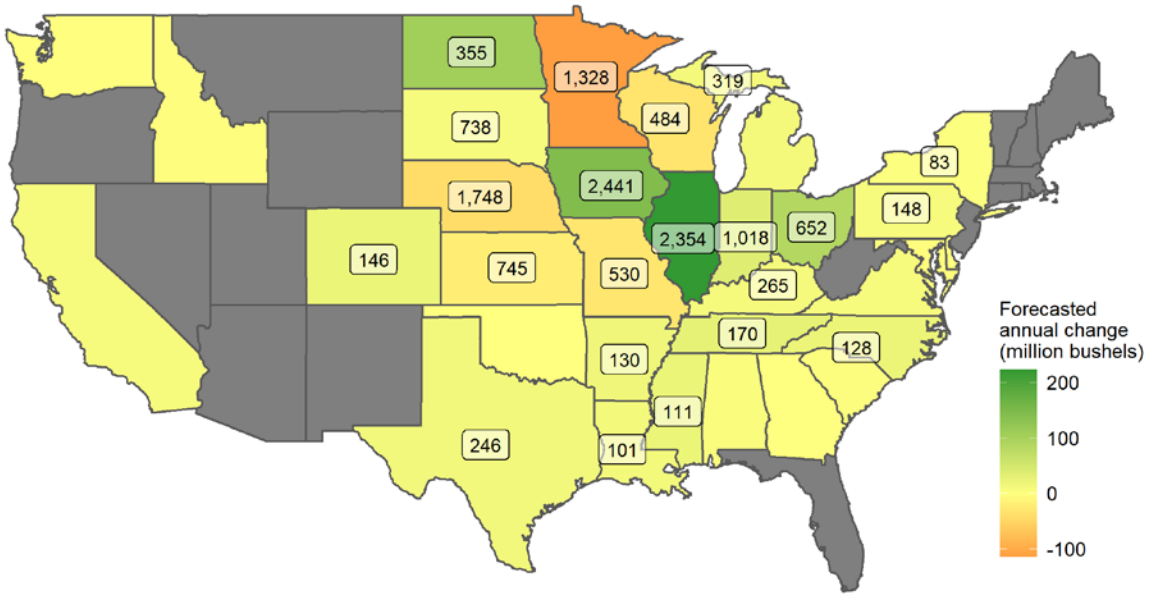



Source: USDA, National Agricultural Statistics Service.

State-level production changes are somewhat offset by the annual increases in acreage for the Western Corn Belt States. For instance, despite North Dakota's lower yield forecasts, NASS currently forecasts corn production in the State to be higher than 2020/21. While some weather-affected corn areas may see increased abandonment or corn reallocated from grain to silage as the season progresses, that would likely be at least partially offset by higher average yields. Nonetheless, the weather impacts thus far in the growing season are likely to have substantial implications for U.S. corn production. Additionally, the weather will have important implications for local and regional corn markets within the United States. Regional corn prices are likely to be an important feature for the upcoming marketing year, as the market moves supplies amongst areas of relative surpluses and deficits.

Figure 3

**U.S. corn production 2021 crop marketing year forecast and annual change, million bushels**




Note: Labels included only for States forecast to produce more than 75 million bushels in 2021.
Source: USDA, National Agricultural Statistics Service.

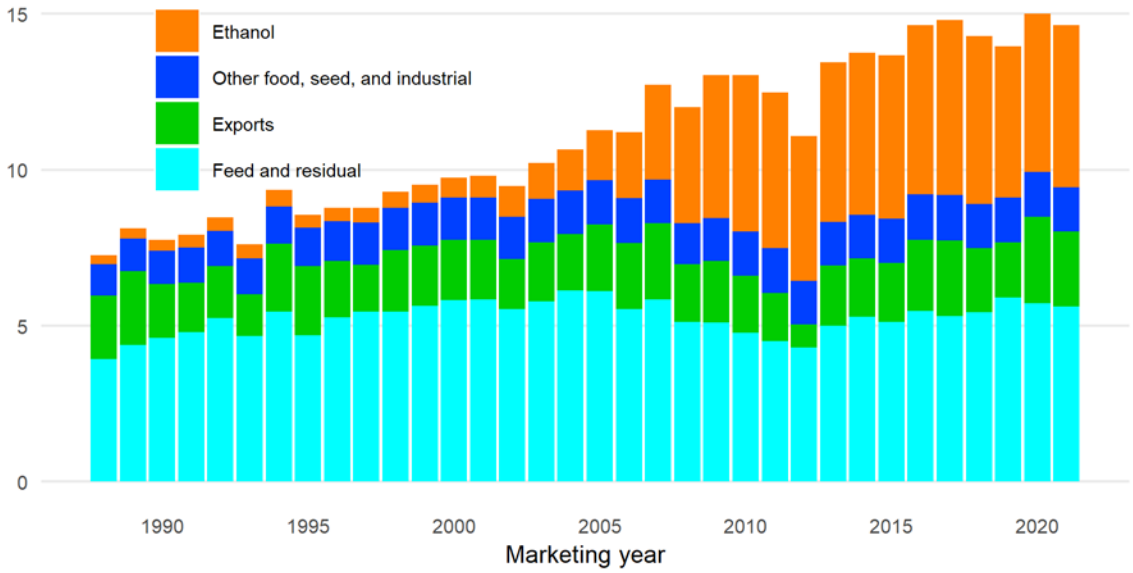
## Domestic Usage Forecasts Mixed on Food, Seed, and Industrial Use

Domestic corn use for 2020/21 is projected at 12,235 million bushels, a 40-million-bushel increase from July. For 2021/22, projected domestic use is lowered 90 million bushels to 12,250 million bushels.

Figure 4

**U.S. corn utilization**

Billion bushels




Note: 2020/21 is estimated. 2021/22 is projected.
Source: USDA, Economic Research Service.

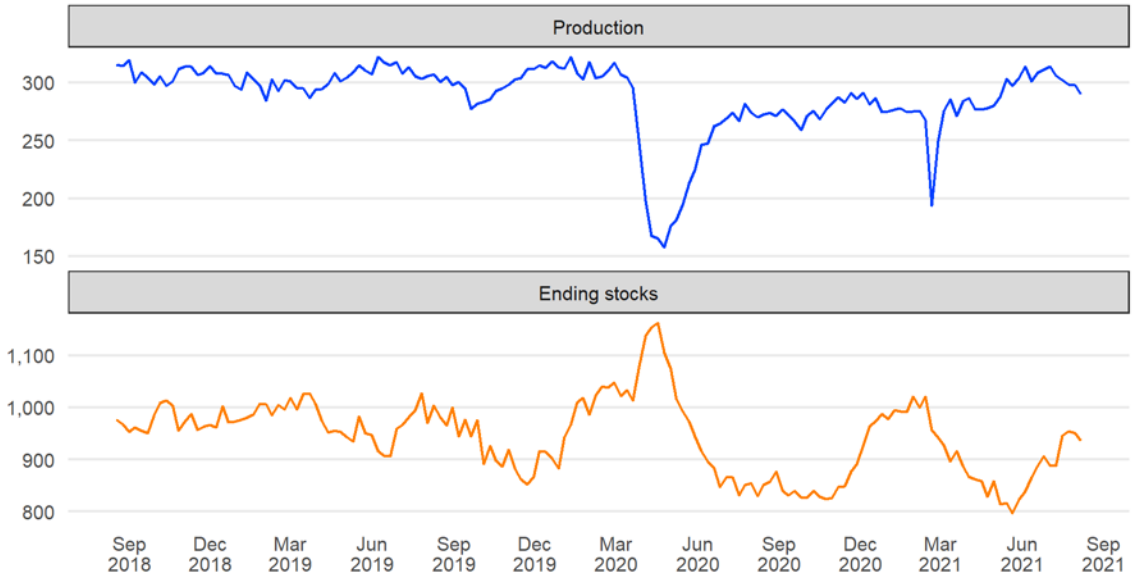
The increases are due to higher food, seed, and industrial use (FSI) estimates in 2020/21. Raised use estimates for starch (up 10 million bushels to 240 million) and glucose and dextrose (up 5 million bushels to 360 million), are due to the increased pace through the first 3-quarters of the marketing year. The sustained pace is projected to carry over into 2021/22, with both categories raised 5-million-bushels from the previous month, at 235 million bushels projected for starch use and 360 million bushels projected for glucose and dextrose.

The fuel ethanol component of FSI is raised 25 million bushels for the 2020/21 estimate, now totaling 5,075 million bushels. The increase is based on the latest June monthly totals from the NASS *Grain Crushings* report and weekly data reported by the Department of Energy's Energy Information Administration (EIA). The spring and summer seasons have seen a substantial recovery in consumers driving and in gasoline consumption, which has supported an increased rate of ethanol production. The weekly pace of ethanol production dipped in the EIA's release ending August 6, which may illustrate some of the tightness of corn supplies. The EIA's weekly motor gasoline product supplied figures continue to be robust, however. Corn used for fuel ethanol is projected at 5,200 million bushels for 2021/22, unchanged from the previous month. This would be a 2.5 percent increase from the current 2020/21 forecast.

Figure 5

**Weekly totals of U.S. ethanol production and ending stocks**

Million gallons




Source: U.S. Department of Energy, Energy Information Administration.

Feed and residual use for 2021/22 is projected to total 5,625 million bushels, a 100-million-bushel reduction from the July report. This would be a reduction from the current 2020/21 estimate of 5,725 million bushels. More discussion on livestock inventories and feed demand can be found later in this report.

## U.S. Corn Exports are at Record Levels, but Pace Declines in Final Months of the Marketing Year

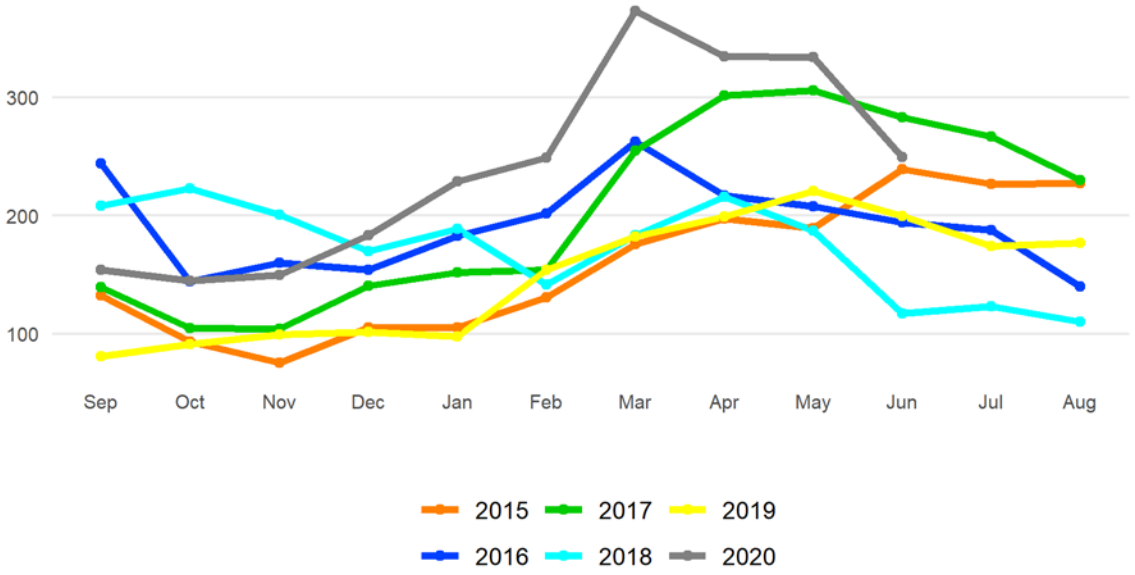
U.S. corn exports estimates for 2020/21 are reduced, but still would be a record at 2,775 million bushels. Through June, the U.S. Bureau of the Census has reported 2,402 million bushels have been exported this marketing year—nearly matching the previous marketing year record of 2,437 million bushels set in 2017/18. June shipments were lower than the previous few months, although still relatively large. Additionally, export inspections data through the first week of August show a continued reduction in the pace, as limited available supplies and higher prices ration back foreign shipments. The record pace of exports in 2020/21 is the result of a substantial increase in shipments to China, as well as maintaining shipments to other traditional export markets, despite increased prices and competition. Tight global supplies and limited production from other major exporters that developed over the course of 2020/21—including

Ukraine and Brazil—have resulted in strong demand for U.S. corn in the global market. For additional discussion on global markets, see the *International Outlook* section of this report.

Figure 6

**U.S. corn exports, total, monthly**

Million bushels

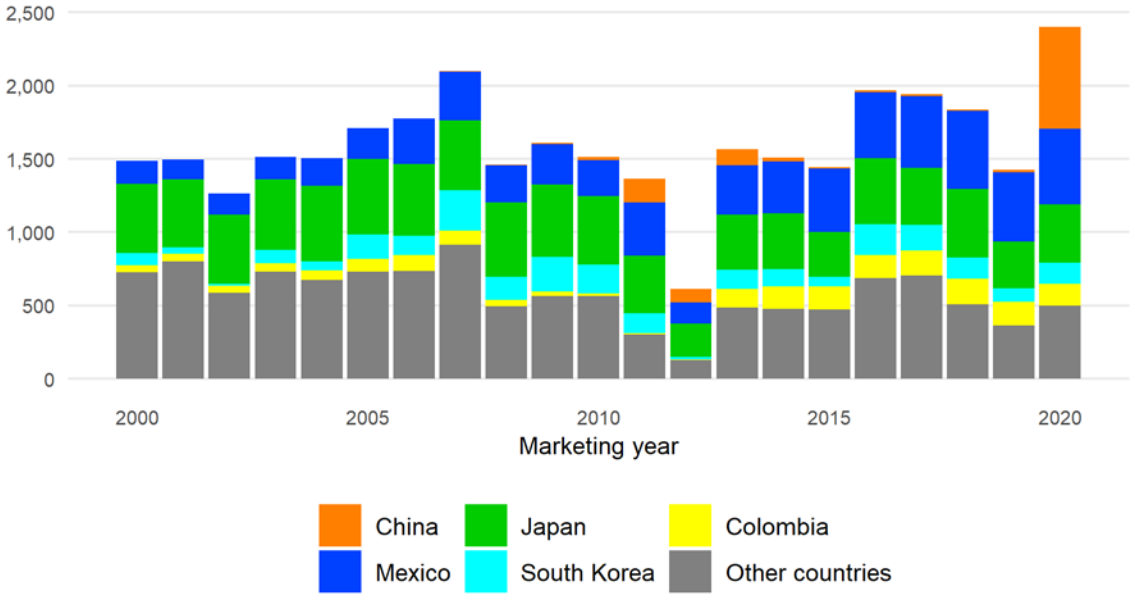



Source: U.S. Department of Commerce, Bureau of the Census.

Figure 7

**U.S. corn exports, September through June, marketing years 2000 to 2020**

Million bushels




Source: U.S. Department of Commerce, Bureau of the Census.

Corn exports for 2021/22 are projected at 2,400 million bushels, a 100-million-bushel reduction from July. Tighter supplies and higher prices in the U.S. market, along with increased competition from other major exporting-countries, are expected to result in the annual decline in exports—although, the current projection is still large by historical standards.

## Fewer Projected Supplies Result in Tighter Ending Stocks, Higher Prices Projected for 2021/22

U.S. corn ending stocks are projected to be 1,242 million bushels for 2021/22—a 190-million-bushel reduction from the July projection. The season-average farm price for 2021/22 is projected at $5.75 per bushel—a $0.15 per bushel increase from the July report, based on a tighter market outlook. This would also be a substantial increase from the current 2020/21 estimate of $4.40 per bushel. Unlike the 2020/21 marketing year, which saw prices steadily increase during the marketing year, relatively elevated futures and cash prices for corn have been in the market since the crop was planted. As a result, the influence of forward contracted corn is expected to have an upward impact on prices received by farmers.

## Production Constraints and Competing Uses Lower Total Feed and Residual Use

Overall, tighter supplies of feed grains and wheat used for animal feed—and the resulting higher feed prices—are likely to affect livestock and animal product markets. Grain-consuming animal units (GCAUs) for 2021/22 are projected at 101.1 million units. This is down from the current 2020/21 estimate of 101.5 million units. The year-over-year reduction is due largely to lower projected beef cattle inventories, where high feed prices have been exacerbated by drought conditions in the Upper Plains and Western regions of the United States. GCAUs for hogs, dairy, and poultry remain relatively flat compared with the previous year, however.

While inventories and implied feed demand may be lower year over year, the current levels are still significantly higher than they were as recently as 5 years ago. In 2016/17, GCAUs totaled 95.8 million units—more than 5-percent lower than the current projection—with the hog and beef sectors accounting for the majority of the additional units during this time. As result, the overall base for feed demand remains high from a longer-term historical perspective.

Total grain feed and residual (including corn, sorghum, barley, oats, and wheat on a September to August basis) for 2021/22 is projected at 148.9 million tons. This is down from the current

2020/21 estimate of 153.4 million tons. Feed and residual for all the commodities are lower on a year-over-year basis.

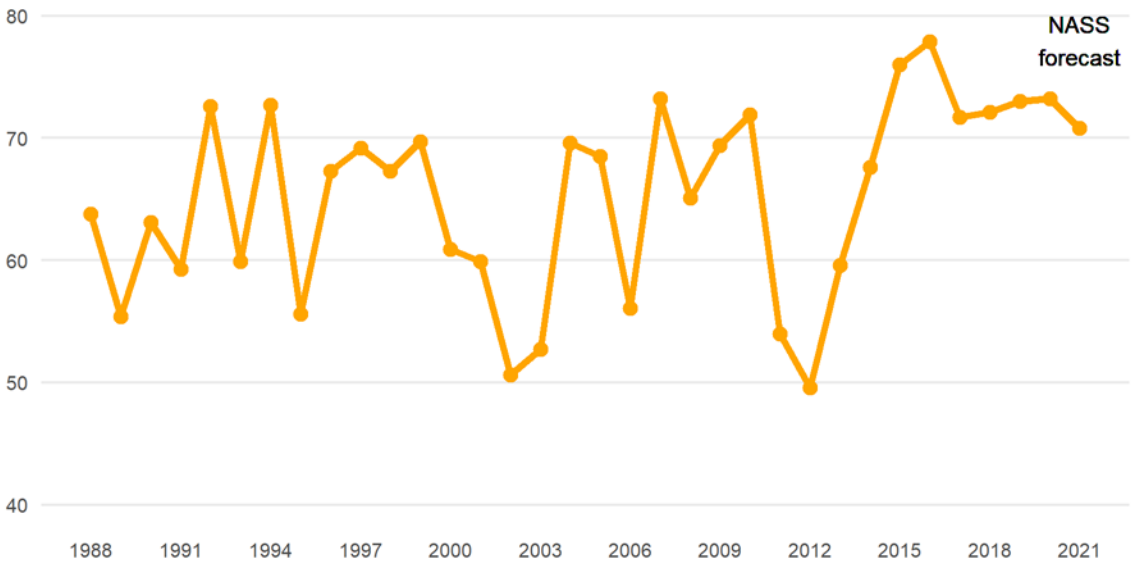
## Sorghum Production Increased for 2021/22

The August *WASDE* reports that sorghum production for 2021/22 is raised to 409 million bushels, up 10 million bushels from the 399 million bushels reported in July. The increase in production comes from a forecasted national average yield of 70.8 bushels per acre, according to the NASS August *Crop Production* report—a 1.8 bushel per acre increase from the 20-year median used in the July *WASDE*. The 2021/22 projected yield is 2.4 bushels per acre lower than the previous year's crop. Projected harvested acreage for 2021/22 remains unchanged from the July report at 5.8 million acres.

Figure 8

**Sorghum yields, United States, 1988 to 2021 forecast**

Bushels per acre



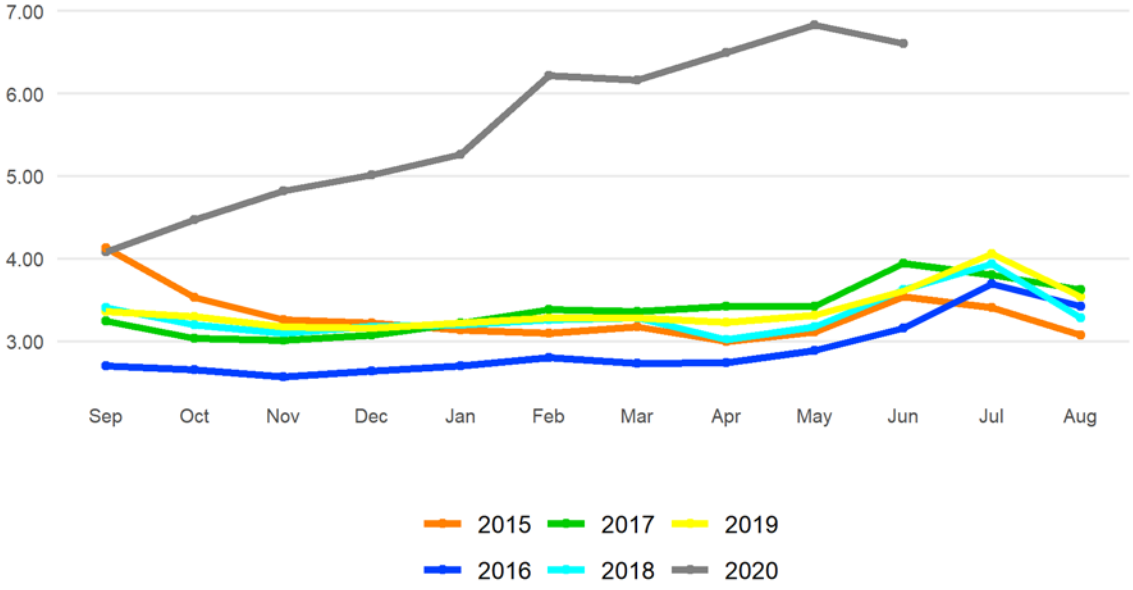

Source: USDA, National Agricultural Statistics Service.

The 2020/21 season-average farm price is estimated to be $5.00 per bushel, down $0.15 from the previous month. The projected average-farm price in market year 2021/22 is $6.15 per bushel, $0.15 higher than July's projection and in line with raised corn price projections.

Figure 10

**Price received for sorghum, monthly**

U.S. dollars per bushel




Source: USDA, National Agricultural Statistics Service.

Export estimates for 2020/21 are lowered by 20 million bushels to 285 million bushels, based on the recent lower pace of shipments and relatively tight inventories remaining in the market. Feed and residual use for 2020/21 is revised higher at 95 million bushels compared to the July report, reflecting additional U.S sorghum supplies in the market. Ending stocks remain unchanged at 13 million bushels.

No changes are made to 2021/22 projected sorghum exports at 320 million bushels in 2021/22, however, exports see a 12 percent increase from the previous market year estimate. Strong foreign demand for feed is expected to maintain sorghum exports into the 2021/22 crop year.

## Barley Price Lowered for 2021/22, but Remains Historically High

Barley production for 2021/22 is projected to be 106 million bushels, a 9-million-bushel decrease from the July report. NASS's August *Crop Production* report reduced the national barley yield to 51.6 bushels per acre, from the 55.9 bushels per acre forecast the previous month. The current yield forecast is 33-percent lower than the previous year's crop, as much the largest-producing barley States—such as Montana, North Dakota, and Idaho—have been significantly affected by drought conditions this year. Imports for 2021/22 are unchanged at a

projected 7 million bushels, as drought conditions are also present in Canada's barley-producing regions.

The reduction in barley supplies results in lower projected FSI use, down 5-million-bushels to 115 million. The season-average farm price projection is lowered $0.20 per bushel to $5.75, based on the June monthly levels reported by NASS—which was the first month of the marketing year. The current projection is still considerably larger than the previous year's season-average price of $4.75 per bushel, as well as the recent historical average.

## Oat Supplies in 2021/22 are Reduced on Lower Imports

U.S. oat production for 2021/22 is projected to be 41 million bushels, virtually unchanged from July. NASS forecast this year's national crop to be 57.4 bushels per acre (versus 57.2 bushels per acre in July) on 0.7 million acres of harvested area. Oat imports are reduced sharply from the July report, down 15 million bushels to 77 million. Most of the U.S. oat supply is imported. The decrease is due to lower production forecast from Canada, the largest foreign supplier of oats in the United States. The Canadian oat crop has been largely affected by the extreme heat and drought that has occurred in Canada's Prairie region.

The reduced oat supply outlook for 2021/22 lowers projected feed and residual use by 15-million-bushels to 50 million bushels. The projected season-average farm price for oats remains unchanged from the previous month at $3.60 per bushel in 2021/22. Similar to barley, this is a significant increase from the previous year's price of $2.77.

# International Outlook

Olga Liefert

## United States Drives Global Production Down; Outside the United States, Less Barley and Oats, but More Corn and Rye

**Global** coarse grain production in 2021/22 is projected to reach 1,484.4 million tons, down 12.4 million this month. **Foreign** coarse grain production (global minus U.S. output) is projected 1.95 million tons lower this month at 1,096.1 million, with reduced barley and oats output partly offset by higher corn and rye production. The projected foreign production is 45.8 million tons higher than a year ago. The ***U.S.*** coarse grain output is reduced 2.7-percent, with downward yield revisions for corn and barley, but with higher yield projected for sorghum.

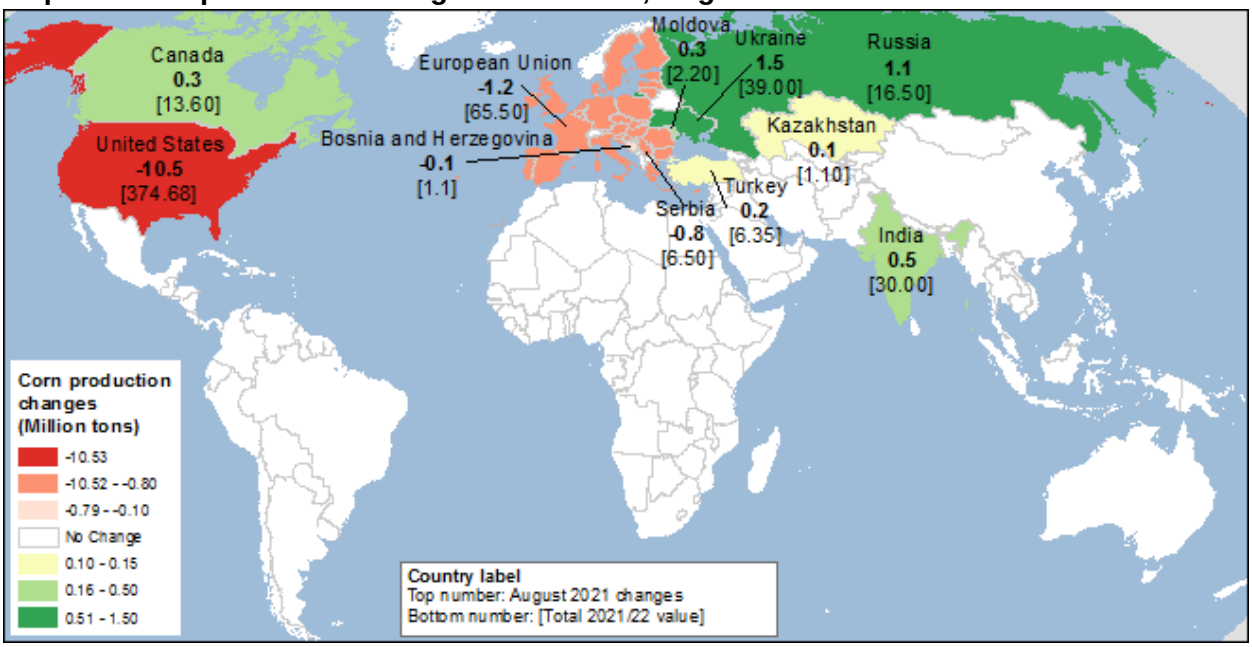
The beginning of August is an important time for gathering information about global grain production prospects. In the Northern Hemisphere, winter grain harvests are being tallied, while summer crops like corn are going through critical reproductive growth stages. Some Southern Hemisphere crops for the 2020/21 crop year are still being harvested, while others are in the early stages of development, or await planting for the 2021/22 crop cycle.

This month, for a number of key grain-producing countries, production for coarse grain for **2021/22** is being revised down: for ***Canadian*** barley and oats, ***European Union (EU)*** corn and barley, ***Serbian*** corn, as well as for **Russian** and ***Kazakhstan*** barley. At the same time, yields for ***Ukrainian***, ***Russian***, ***Indian***, and ***Canadian*** corn—as well as for ***Australian*** and ***Ukrainian*** barley—are projected higher. Coarse grain production for **2020/21** is also projected lower, with a significant 6-percent cut in ***Brazilian*** corn output.

For a visual at a glance presentation of this month's changes in corn and barley production, see maps A and B.

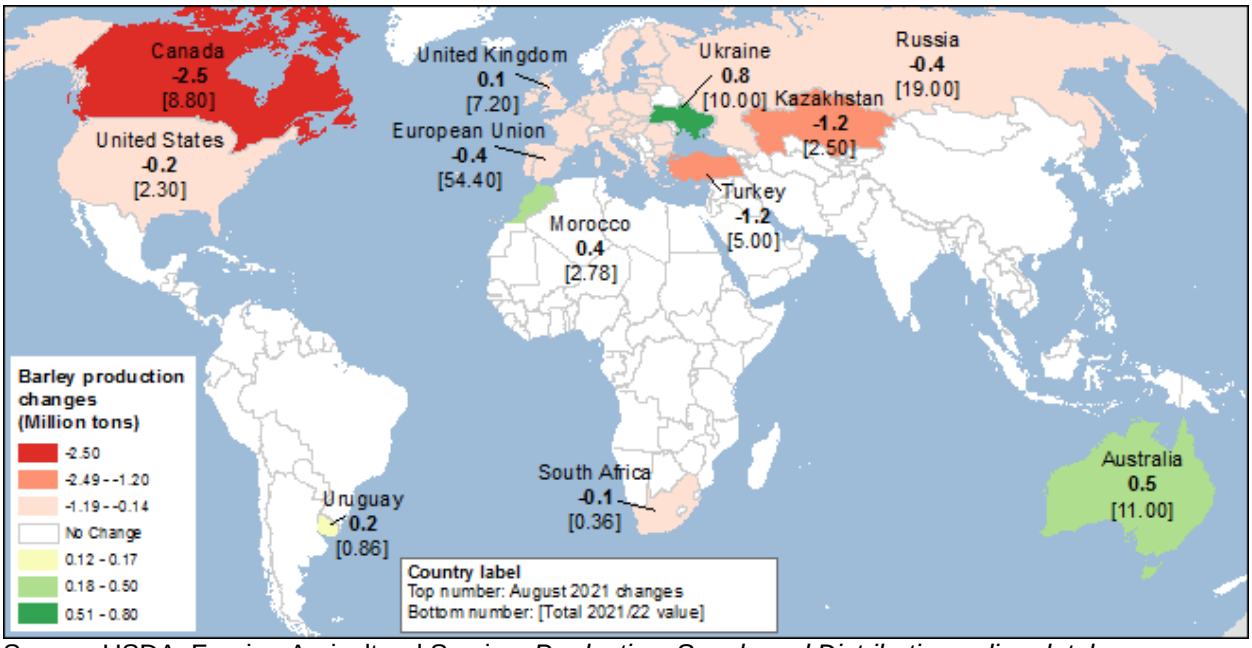
For more information about this month's production changes, see tables A1 (total global, foreign, and U.S. changes), table A2 (**2021/22** specific countries' changes), and table A3 (**2020/21** country changes) below.

**Map A – Corn production changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

**Map B – Barley production changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

| Table A1 - World and U.S. coarse grain production at a glance (2021/22), August 2021 | | | | | |
|---|---|---|---|---|---|
| | Region or country | Production | Change from previous month[1] | YoY[2] change | Comments |
| | | *Million tons* | | | |
| **Coarse grain production (total)** | | | | | |
| ↓ | **World** | **1,484.4** | **-12.4** | **+59.5** | |
| ↓ | **Foreign** | **1,096.1** | **-1.9** | **+45.8** | Partly offsetting changes are made across countries and commodities. See table A2. |
| ↓ | **United States** | **388.3** | **-10.5** | **+13.7** | See section on U.S. domestic output. |
| **World production of coarse grains by type of grain** | | | | | |
| **CORN** | | | | | |
| ↓ | **World** | **1,186.1** | **-8.7** | **+70.7** | |
| ↑ | **Foreign** | **811.4** | **+1.8** | **+56.3** | Higher corn output in Ukraine, Russia, Canada, Moldova, and India is partly offset by reductions for the EU[3] and Serbia. Other smaller changes are offsetting. See table A2. |
| ↓ | **United States** | **374.7** | **-10.5** | **+14.4** | See section on U.S. domestic output. |
| **BARLEY** | | | | | |
| ↓ | **World** | **149.4** | **-4.0** | **-10.8** | |
| ↓ | **Foreign** | **147.1** | **-3.8** | **-9.5** | Reductions are made for Canada, Russia, Turkey, Kazakhstan, and the EU[3], with partly offsetting changes for Ukraine, Australia, and Morocco. See table A2. |
| ↓ | **United States** | **2.3** | **-0.2** | **-1.3** | See section on U.S. domestic output. |
| **SORGHUM** | | | | | |
| ↑ | **World** | **64.6** | **+0.1** | **+2.4** | |
| ↓ | **Foreign** | **54.2** | **-0.1** | **+1.5** | Production in the EU[3] is projected slightly lower. |
| ↑ | **United States** | **10.4** | **+0.3** | **+0.9** | See section on U.S. domestic output. |
| **OATS** | | | | | |
| ↓ | **World** | **23.6** | **-0.7** | **-2.0** | |
| ↓ | **Foreign** | **23.0** | **-0.7** | **-1.7** | Lower output projected for Canada, Russia, and the United Kingdom is partly offset by higher EU[3] production. See table A2. |
| | **United States** | **0.6** | **Small change** | **-0.3** | See section on U.S. domestic output. |
| **RYE** | | | | | |
| ↑ | **World** | **13.7** | **+0.6** | **-0.6** | |
| ↑ | **Foreign** | **13.4** | **+0.6** | **-0.7** | Higher production projected for the EU[3], other small changes are virtually offsetting. |
| | **United States** | **0.3** | **No change** | **Small change** | See section on U.S. domestic output. |
| **MIXED GRAIN** | | | | | |
| ↑ | **World/Foreign** | **15.9** | **+0.3** | **-0.1** | Increase in the EU[3] is partly offset by a reduction for Canada. |

[1]Change from previous month.[2] YoY: year-over-year changes.[3] EU: European Union. **For changes and notes by country, see table A2.**

Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

| Table A2 - Coarse grain foreign production changes by country for 2021/22, August 2021 | | | | | | |
|---|---|---|---|---|---|---|
| | Type of crop | Crop year | Production | Change in forecast[1] | YoY[2] change | Comments |
| | | | *Million tons* | | | |
| **UKRAINE[3]** | | | | | | |
| ↑ | **Corn** | *Oct-Sep* | **39.0** | **+1.5** | **+8.7** | Excellent moisture level and warm temperatures in July pushed the Vegetation Health Index (VHI) and projected corn yields higher. Slightly lower reported planted area is partly offsetting an increase in corn yield. |
| ↑ | **Barley** | *Jul-Jun* | **10.0** | **+0.8** | **+2.1** | Higher barley area and record-high yields push barley output higher. The changes are based on reported final area and the harvest reports, with more than 80 percent completed. |
| **EUROPEAN UNION (EU)** | | | | | | |
| ↓ | **Corn** | *Oct-Sep* | **65.5** | **-1.2** | **+1.0** | July scorching heat wave in southeastern Europe limited yield potential in **Hungary** and **Romania** - the two major European corn producers. At the same time, with cool temperatures and plentiful moisture in the northwestern part of the region, yields projected for **France** and **Germany** partly offset the reduction. |
| ↓ | **Barley** | *Jul-Jun* | **54.4** | **-0.4** | **-1.1** | Partly offsetting revisions are made for a number of countries of the region, resulting in slightly lower area and yield. Barley has been already harvested. |
| ↑ | **Oats** | *Jul-Jun* | **8.2** | **+0.8** | **-0.3** | Multiple revisions are made this month, resulting in higher projected oats area and yields. Smaller revisions are made for rye (up 0.7 million tons), sorghum (down 0.1 million tons), and mixed grain (up 0.4 million tons). |
| **SERBIA** | | | | | | |
| ↓ | **Corn** | *Oct-Sep* | **6.5** | **-0.8** | **-1.5** | The same scorching heat that swept southeastern Europe hurt corn yields in neighboring Serbia. |
| **CANADA** | | | | | | |
| ↑ | **Corn** | *Sep-Aug* | **13.6** | **+0.3** | **Small change** | Timely rains and cool temperatures boost yield prospects for Ontario and Quebec. |
| ↓ | **Barley** | *Aug-July* | **8.8** | **-2.5** | **-1.9** | Prolonged heat and dryness stunted crops throughout Prairies and hurt yields beyond repair. Yields are projected now 20 percent lower than last month. |
| ↓ | **Oats** | *Aug-July* | **3.1** | **-0.8** | **-1.5** | Oats are grown in the same areas in the Prairies as wheat and barley, with comparable reduction in projected yields. |
| **RUSSIA[3]** | | | | | | |
| ↑ | **Corn** | *Oct-Sep* | **16.5** | **+1.1** | **+2.6** | Higher projected corn area, based on the Government report. |
| ↓ | **Barley** | *Jul-Jun* | **19.0** | **-0.4** | **-1.6** | An official crop area report stated reduced spring barley area; higher area planted for winter barley is partly offsetting. |
| ↓ | **Oats** | *Jul-Jun* | **4.1** | **-0.4** | **Small change** | Reduction in the final reported oats area. |
| **KAZAKHSTAN[3]** | | | | | | |
| ↓ | **Barley** | *Jul-Jun* | **2.5** | **-1.2** | **-1.2** | Lower reported area, and intense heat and dryness in the major producing areas, are expected to limit yields and output. |
| **TURKEY** | | | | | | |
| ↓ | **Barley** | *Jun-May* | **5.0** | **-1.2** | **-3.1** | Extreme drought and low water level in reservoirs sharply reduced yields and area, leaving some fields unharvested. |
| **AUSTRALIA** | | | | | | |
| ↑ | **Barley** | *Nov-Oct* | **11.0** | **+0.5** | **2.0** | Favorable July rains were beneficial for winter crops. Barley yields are projected higher. |
| **INDIA** | | | | | | |
| ↑ | **Corn** | *Nov-Oct* | **30.0** | **+0.5** | **-0.3** | Larger reported area under corn, on par with the previous year. |

[1]Change from previous month. Smaller changes for various coarse grain output are made for a number of countries.

[2] YoY: year-over-year changes.[3] Area is revised for every grain crop in Ukraine, Russia, and Kazakhstan based on newly reported official area.

Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database* .

Coarse grain production for 2020/21 is reduced this month, down 4.5 million tons, led by a massive reduction in ***Brazilian*** corn production. For the crop year of **2020/2**1—that started in March 2021 and will last through February 2022—corn production in Brazil this month is projected down 6 million tons to 87 million. The National Supply Company of Brazil (CONAB), as well as other state-level official sources, have published production estimates that further reduce yields for all major corn-producing states of the country—with the exception of Mato Grosso. This Southern Hemisphere country is currently in the midst of its second-crop corn harvest. Affected by drought during the growing season and late frosts, the second-crop (safrinha) corn is now projected much smaller than initially forecast.

See table A3 for more information on this month's coarse grain output changes for the crop year of **2020/21**.

**Table A3 - Coarse grain foreign production changes by country for 2020/21, August 2021**

| | Type of crop | Crop year | Production | Change in forecast[1] | YoY[2] change | Comments |
|---|---|---|---|---|---|---|
| | | | *Million tons* | | | |
| | | | **BRAZIL** | | | |
| ↓ | **Corn** | *Mar-Feb* | **87.0** | **-6.0** | **-15.0** | The reduction is based on harvest reports, with yields at the lowest since the 2015/16 unfortunate crop. Corn yields are projected lower in all states except Mato Grosso. Harvesting of the 2020/21 crop is on the way, with virtually all first-crop corn and about 52 percent of second-crop corn completed. |
| | | | **SOUTH AFRICA** | | | |
| ↑ | **Corn** | *May-Apr* | **17.2** | **+0.2** | **+1.4** | The increase reflects the South African Crop Estimates Committee (CEC) recently updated production forecast. |
| | | | **EUROPEAN UNION (EU)** | | | |
| ↑ | **Corn** | *Oct-Sep* | **64.5** | **+0.5** | **-2.3** | Revisions are made for **France**, **Germany, Bulgaria, Slovakia, Croatia**, and **Belgium-Luxembourg**. |
| ↓ | **Barley** | *Jul-Jun* | **55.5** | **+0.2** | **+0.2** | Revisions are made for **Denmark**, **Finland**, and a number of other EU countries. |
| | | | **ARGENTINA** | | | |
| ↑ | **Sorghum** | *Mar-Feb* | **3.4** | **+0.2** | **+0.9** | Higher projected area. The increase is supported by the official reports. |
| | | | **URUGUAY** | | | |
| ↑ | **Barley** | *Dec-Nov* | **0.9** | **+0.2** | **+0.3** | Exceptionally good weather and new seed varieties boosted yields to a record-high. The increase is supported by the official reports. |
| | | | **MEXICO** | | | |
| ↑ | **Barley** | *Jul-Jun* | **0.9** | **+0.1** | **-0.1** | A revision of area and yield based on Government reports. |

[1]Change from previous month. Smaller changes for coarse grain output are made for several countries.

[2] YoY: year-over-year changes.

Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

## World Coarse Grain Use and Stocks Projected Lower

World coarse grain use in 2021/22 is projected down 4 million tons this month. Much of the reduction is in forecast U.S. use, but foreign consumption is also projected down. The use of foreign coarse grain is projected 1.6 million tons lower—with a reduction for barley and oats, an increase for corn, and rye, and virtually unchanged sorghum. All revisions in domestic feed grain use follow changes in respective crops' production and imports.

The most important changes include a sizeable reduction in ***Chinese*** barley feed use, projected 1 million tons lower this month, as ***Canada*** exports nearly all of its barley to China (barley output in Canada dwindled, thereby also limiting its own domestic use). The reduction in coarse grain feeding for China is partly offset by higher sorghum use, owing to increased imports. Both corn and barley feed use in ***Iran*** is reduced this month, leaving corn feed consumption on par with last year. The change follows a reduction in ***Brazilian*** corn output, and barley output for ***Kazakhstan***, the major suppliers of Iranian feed grain. Barley feeding is reduced for ***Turkey,*** following a production cut. Numerous smaller changes are made across all coarse grain for a number of countries.

Global coarse grain ending stocks projected for 2021/22 are cut 7.2 million tons this month. The United States accounts for 70 percent of the reduction, as foreign stocks are forecast down 2.3 million tons. Among numerous changes in ending stocks, the largest are a 0.5-million-ton reduction for ***Brazil*** (lower corn production forecast for 2020/21) and for ***Mexico***, with reduced corn imports from the United States and Brazil. Partly offsetting is an increase in corn stocks in ***Paraguay***, reflecting a production revision for 2019/20.

## World Corn Trade Reduced, U.S. Export Prospects Down

With a 2-million-ton reduction in corn exports projected for the ***United States***, the total **global trade** for 2021/22 for the international October-September 2021/22 trade year is reduced by 3 million tons. With this reduction, global corn trade nonetheless is projected at the still record-high level of 191.4 million tons, up 7.3 million from the year before.

**Corn** trade in both the 2021/22 international trade year starts in October, and in the current 2020/21 trade year ending in September, is significantly altered this month by a sharp 5-million-ton cut in export prospects for ***Brazil***, a reduction expected to spread across both trade years. Corn exports from Brazil are projected down for both the 2020/21 and 2021/22 international trade years as low corn supplies for 2020/21 are expected to weigh down on Brazilian exports

through February (the last month of the country's local crop year), almost half a year into the October-September trade year. A 2-million-ton reduction is projected to transpire before the end of September (trade year 2020/21) to a total of 28 million tons, while for the upcoming trade year of 2021/22, exports are projected to decline by 3 million tons to reach 34 million. For the local March-February 2020/21 marketing year, Brazilian corn exports are reduced 5 million tons.

Reduced Brazilian corn exports are expected to alter the corn imports of its largest buyers—such as ***Iran***, ***Egypt***, and ***Vietnam***—whose imports from Brazil dwindled in July, in comparison with the last several years. Although some additional corn will likely be sourced by these countries from corn producers other than Brazil, elevated prices and the difficulties of finding full substitute foreign suppliers in the short run are expected to weigh down on their total corn imports. Corn imports are also reduced for ***Saudi Arabia***, ***South Korea***, ***Mexico***, J***apan***, and ***Algeria***—the countries that source much of their corn imports from both the ***United States*** and ***Brazil***.

As output in ***Romania, Hungary***, and ***Bulgaria***—the major eastern European corn producers that export outside the region—is expected to be reduced, corn exports are projected 0.5 million tons lower this month for the ***European Union***, limiting corn shipments outside the region. Neighboring ***Serbia*** suffered from adverse weather conditions similar to Romania and Hungary, and Serbian exports are also reduced.

Corn exports by ***Argentina*** are boosted this month for both the 2020/21 and 2021/22 international trade years, up 1 and 0.5 million tons, respectively. Argentina is currently the most price-competitive corn exporter and its recent pace of exports is strong. Argentine higher exports are expected to partly offset the reductions for the United States and Brazil.

In the 2021/22 trade year, ***Ukraine*** and ***Russia*** are expected to share the opportunity offered by the projected increase in their corn output, partly filling the gap created by the Brazilian corn shortage. Ukraine is expected to export an additional 1.5 million tons of corn, bringing its exports to 32 million tons, an all-time record. Russian corn exports are boosted by 0.6 million tons, just slightly more than half of its additional output, because corn area expansion is expected to have occurred to a large part in the Central District of the country (which has limited export opportunities). Exports are also projected higher in ***Moldova***, a small country located southwest of Ukraine, expected to have record-high corn yield.

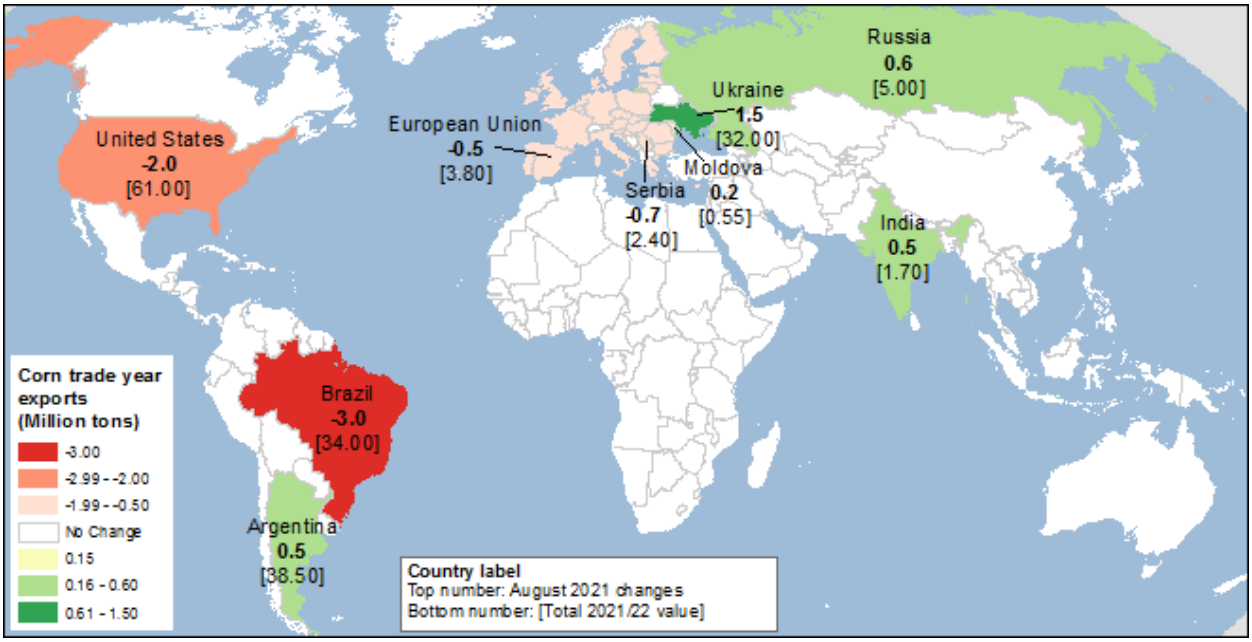
***India*** is another large corn producer that is expected to expand exports because of higher output, increasing its sales to neighboring ***Bangladesh*** and ***Nepal***, though also to ***Malaysia*** and ***Vietnam***.

***U.S.*** corn exports in **2021/22** for the October-September international trade year are projected at 61 million tons. This is a reduction of 2 million tons from July, followed by a cut in U.S. supplies and the weak recent pace of new crop sales. For the September-August local marketing year, exports are down by 100 million bushels to 2,400 million. Although outstanding new-crop sales for 2021/22 reached 18.1 million tons on August 5, 2021, up from 11.5 million tons a year ago, sales are slowing down just as Argentina and Ukraine begin to pose strong competition for U.S. corn exports. While U.S. corn supplies are still adequate despite the production cut, the country's price competitiveness is declining, and both current and forward export prices for corn are floating above those for Argentina and Ukraine.

***U.S***. corn exports are forecast 0.5 million tons lower for **2020/21** trade year at 72.5 million, based on slower shipment data to date. Recently the United States became less price-competitive, as a successful corn harvest in Argentina is getting close to conclusion and production prospects in Ukraine are improving. For the local September-August marketing year, the U.S. corn export forecast is down 75 million bushels to 2,775 million.

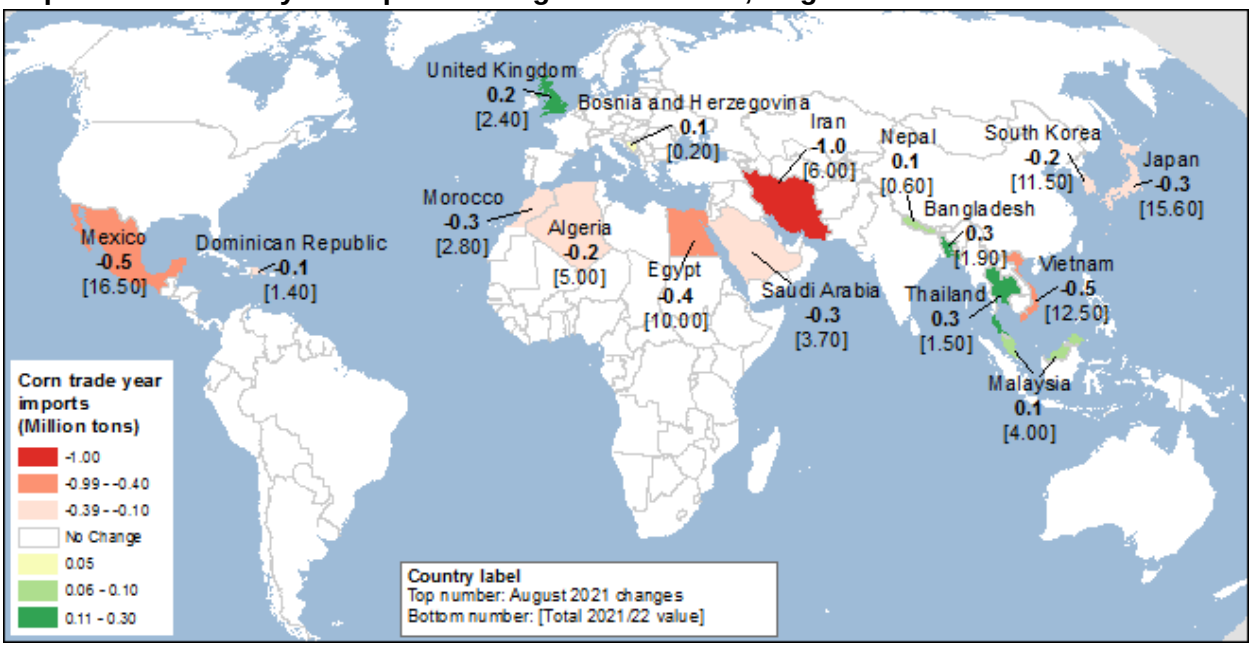
To view this month's changes in corn trade year exports and imports, see maps C and D.

**Map C – Corn trade year exports changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

**Map D – Corn trade year imports changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

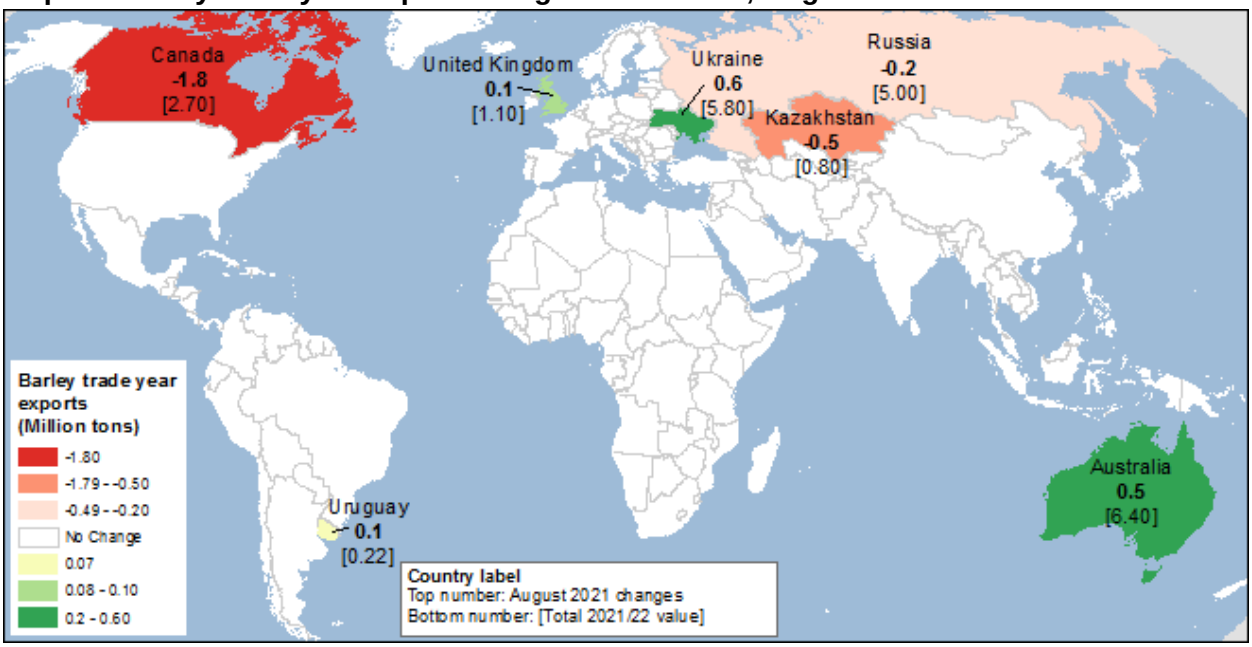
World **barley** exports are down 1.2 million tons this month. With lower projected barley output, ***Canadian***, ***Kazakhstan***, and ***Russian*** exports fell this month. As the bulk of Canadian barley exports under normal circumstances go to ***China***, barley imports for China are also reduced, although by a smaller amount, assuming additional barley coming from ***Ukraine***. Because Kazakhstan is the major barley supplier for ***Iran***, that country's imports are also reduced.

With higher projected barley output, exports are raised for ***Australia***, Ukraine, and the ***United Kingdom (UK)***. Some of the additional barley exports from Australia are expected to go to ***Thailand*** and ***Vietnam***.

Several adjustments are made for sorghum trade for the trade year of **2020/21**. Exports are raised for ***Argentina*** (higher projected output) and ***Australia*** (fast recent pace of trade). Both countries are currently exporting sorghum to ***China***, partly supplanting the ***United States***, whose sorghum exports for 2020/21 are down 0.3 million tons this month to 7.5 million.

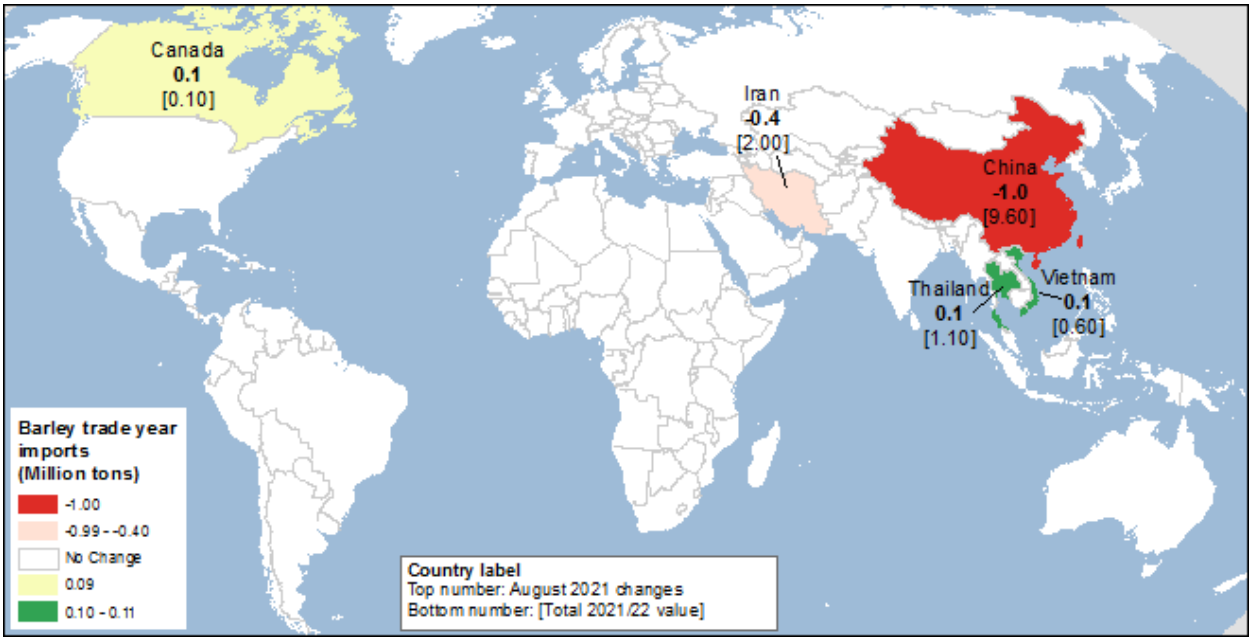
To view this month's changes in barley trade year exports and imports, see maps E and F.

**Map E – Barley trade year export changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

**Map F – Barley trade year import changes for 2021/22, August 2021**




Source: USDA, Foreign Agricultural Service, *Production, Supply and Distribution online database*.

# Special Article: U.S. Organic Corn and Soybean Markets

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Michael McConnell

## Production, Trade, and Integrity in Organic Grains and Oilseeds Markets

Production of organic corn and soybean in the United States is growing, as a response to soaring demand for organic livestock and processed food products. Nevertheless, organic farming of these two commodities constitutes a small portion of total corn and soybean acreage. Overall, conventional production dominates the corn and soybean market, and organic growing remains a niche part of the market. As a result, production reporting rarely separates organic and conventional production. But substantial interest surrounds organic production, particularly because of continued advances in the markets for organic livestock and dairy. This special article elaborates on the disparities in organic and conventional production of corn and soybeans—discussing differences, trends, and recent changes in the organic markets.

## Difference Between Organic and Conventional Feedstuff

Organic corn and soybeans are nutritionally equivalent to their conventional counterparts, but are grown adhering to the methods outlined by the USDA Agricultural Marketing Service (AMS) National Organic Program (NOP). Producers undergo a 3-year transition period to convert growing operations from conventional to organic, at which time no prohibited materials may be applied to the fields. Prohibited materials (published in the AMS National List of Allowed and Prohibited Substances) include many fertilizers, insecticides, herbicides, and fungicides typically used by conventional farms. Organic producers also manage soil fertility and crop nutrients (via tillage, crop rotations, and cover crops). Growers primarily use physical, mechanical, and biologic controls to address pests, weeds, and disease. The growers resort to substances from the approved list when other practices are not sufficient. Genetic engineering and ionizing

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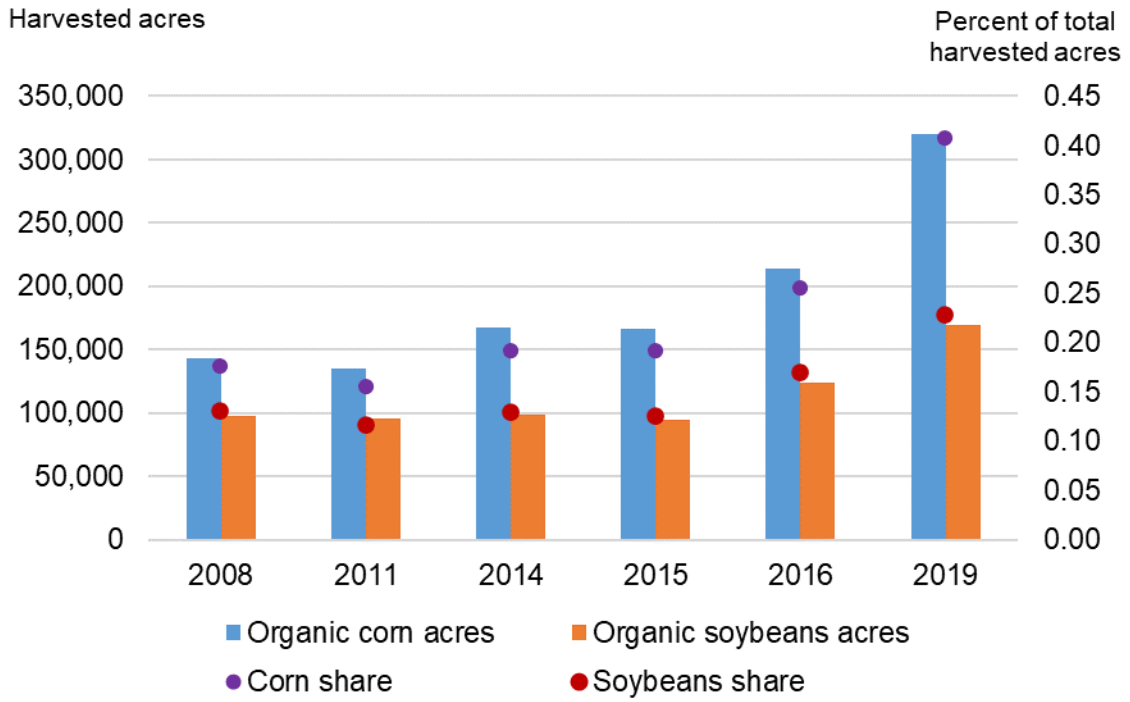
radiation are not allowed. Because of the unique practices, organic farming typically incurs higher production costs than conventional; McBride et al. (2015) found organic corn and organic soybean costs to be between $83–98 and $106–125 higher per acre than conventional costs, respectively. Upon certification, organic producers can differentiate their products by adding the USDA Organic seal to their products. Upon receiving the seal, the producers can then receive a price premium and recoup those additional production costs.

## Comparisons Between Organic and Conventional Corn and Soybeans in the United States

Fast-growing demand for organic food products caused a significant expansion of U.S. organic production—particularly in high-value commodities such as fruits, vegetables, dairy, and eggs. Corn and soybeans are standard in feed ratios for providing energy and protein, so demand for organic feed corn has increased as well. Acres used for production of organic corn for grain grew 124 percent from 2008 to 2019, and acres for organic soybeans for bean advanced 73 percent in that time (see figure 1). In comparison, total corn for grain acres were 3 percent lower in 2019 than in 2008, while total soybean acres fell 0.4 percent. In other words, while total corn and soybean acreage has mostly remained stable, the proportion of acres devoted to organic has trended up. Yet despite the upward trend, the organic share of total domestic corn and soybean acreage remains relatively low, accounting for less than 1 percent of total harvested acres for each crop in 2019.

Figure SA1

**Organic corn and soybeans harvested acreage and shares of organic acres over total corn and soybean harvested acreage**

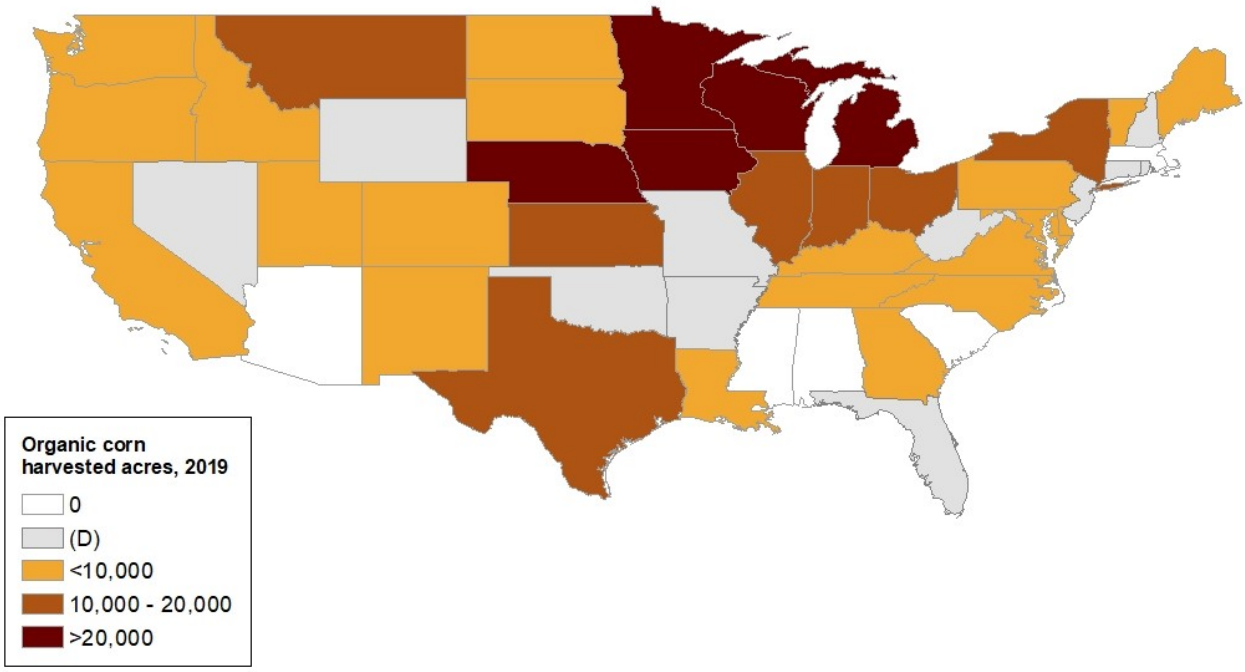



Source: USDA, National Agricultural Statistics Service.

In general, corn production is concentrated in the Heartland states—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio, Nebraska, North Dakota, South Dakota, and Wisconsin—with Iowa and Illinois (combined) harvesting between a quarter and a third of total acres. In 2019, 84 percent of all harvested corn acres were grown in a Heartland state. However, a closer look at the geographic distribution of organic corn reveals a different pattern. In particular, harvested acres of organic corn are more dispersed outside of the traditional region (see figure 2), with 68 percent grown in the Heartland states.

Figure SA2

**Organic corn harvested acres by State, 2019**



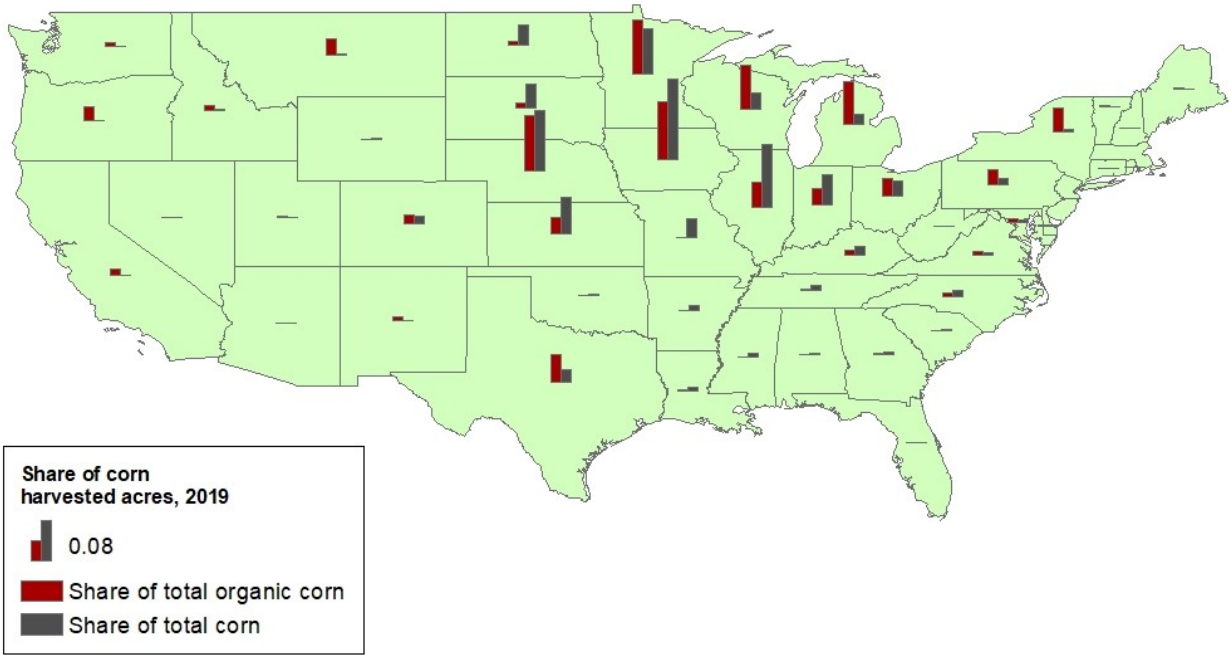

Note: (D) signifies information was withheld by NASS to avoid disclosing data for individual farms.
Source: USDA, National Agricultural Statistics Service.

A variety of factors are likely fueling organic corn production growth outside of the traditional corn regions. For example, 6 percent of organic corn is grown in Texas and 5 percent in New York (see figure 3). States such as Texas may have fewer pest pressures, important given the more limited pest control techniques allowed in organic farming. Additionally, corn is a self-pollinating crop. Corn sheds pollen from its tassels which is carried by the wind to pollinate corn silk. The self-pollination process poses a large risk when attempting to grow organic corn close to neighboring fields of conventional corn because pollen from a conventional field could pollinate an organic growers' field. Growers can reduce the risk of cross-pollination by adding buffer strips—physically separating conventional and niche growing areas—and delaying planting (to reduce the overlap of pollination among organic and genetically modified varieties). However, the latter strategy may further suppress yields, impacting farmers' ability to sow each crop by the optimal planting date. Animal production markets likely also play a part in the geographic location of organic feed farms. In 2019, Texas accounted for 16 percent of organic

milk sales, and New York accounted for 5 percent of organic milk sales, which could account for the concentrated production of organic feed.

Figure SA3

**Share of organic corn harvested by State, 2019**




Source: USDA, National Agricultural Statistics Service.

A similar story arises for soybeans. Most harvested acres of conventional soybeans are found in the Heartland states, particularly Illinois and Iowa (about a quarter of production comes from these two States). While the main organic soybean producing States are also in the Heartland (Iowa and Michigan each grew 13 percent of the total for organic soybeans in 2019), less traditional States also grew a significant amount of soybeans—for example, North Carolina and New York grew 5 and 4 percent of organic soybean harvested acres in 2019, respectively. Meanwhile, North Carolina and New York only accounted for 2 percent and 0.3 percent, respectively, of the overall national total for soybeans production in 2019.

## The Price Premium for Growing Organic Collapsed in Late 2020

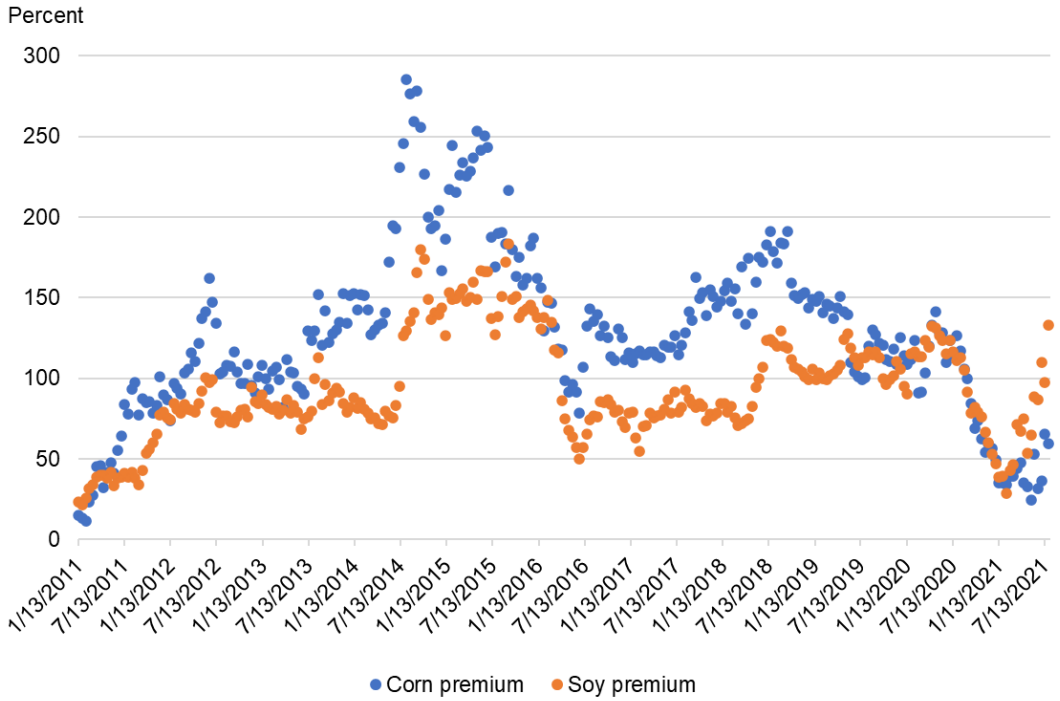
Organic corn and soybeans normally fetch a premium price over their conventional counterparts, to compensate producers for the additional production costs. A link between the

price of organic and conventional corn commodities is expected, as niche market prices are often indexed to more established markets (to an extent). The commodities are largely grown in similar areas. Organic corn and soybeans can be sold in the conventional markets, and unlike organics, the conventional markets benefit from more market information that aid in price discovery, marketing plans, and risk management. Raszap Skorbiansky and Adjemian (2021) found a linear relationship (meaning a relationship where two variables move in tandem) between the organic and conventional commodities when analyzing prices from January 2011 to February 2020. According to the study, in equilibrium, organic corn prices can be derived by increasing the corn price by 72 percent and adding $2.85 per bushel, and organic soybeans can be derived by increasing the soybean price by 120 percent and subtracting $2.53 per bushel. But given that markets are subject to random shocks, the formulas above do not always reflect the status of corn and soybeans prices. After a shock, organic prices bear the burden of adjustment back to the equilibrium. That is, a shock to either the organic or conventional market results in the organic price adjusting to bring the premium back to the equilibrium level. However, adjustment is not instantaneous—a $1.00 per bushel rise in the organic premium is corrected through biweekly decreases in organic prices of $0.06 and $0.07 for corn and soybeans, respectively.

The study was conducted right before the start of the COVID-19 pandemic, and the pandemic created large disruptions to all markets. The global outlook for conventional grains and oilseeds dramatically changed in 2020 and 2021. Concerns regarding poor weather in South America, low global stocks, and strong demand from China resulted in substantial price increases for conventional corn and soybeans. However, in late 2020, the organic premium price for these two commodities collapsed significantly. The soybean premium appears to have recuperated recently, but the corn premium did not yet fully recover (see figures 3 and 4).

Figure SA4a

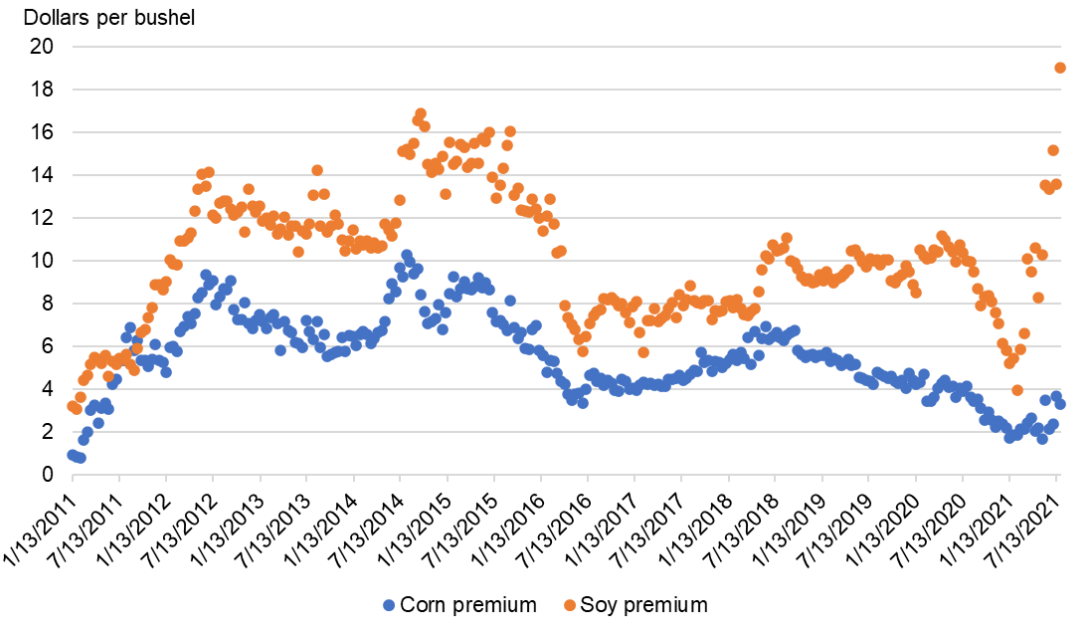
**Price premium for organic versus conventional corn and soybeans, percent**




Source: USDA, Agricultural Marketing Service.

Figure SA4b

**Price premium for organic versus conventional corn and soybeans, dollars per bushel**




Source: USDA, Agricultural Marketing Service.

## Importing Organic Corn and Soybeans: The Primary Competition for Domestic Organic Growers

While the United States is a major corn and soybean producer and exporter, it is a net importer of organic corn and soybeans. Demand for organic corn and soybeans has grown significantly from 2008 to 2019. As a case in point, organic egg sales increased by almost 500 percent and organic milk sales rose more than 100 percent over the same period. Meanwhile, poultry accounts for the majority of feed demand—making up more than half of organic meat, poultry, and seafood sales (OTA, 2020). Inventory of organic broilers is highest in Pennsylvania (more than 41 percent in 2019), California (21 percent), and North Carolina (13 percent). As shown in figure 3, these States are not large growers of organic feed corn. Some feed is likely coming from nearby States, but likely, much is imported. In 2020, the most widely used ports for imports of organic corn and soybeans were San Francisco, CA, Charlotte, NC, and Baltimore, MD. Organic corn also came in via Philadelphia, PA and organic soybeans via New Orleans, LA. Because a large portion of feed is supplied by international producers, the prices appear to have decoupled during the run-up starting in 2020. The precise amount of organic imports of corn and soybeans is uncertain, since in the United States there is only a single Harmonized System[2] code for organic corn ("Organic Yellow Dent Corn, Except Seed") and two codes for soybeans: ("Organic Soybeans Except Seed," and "Organic Soy Flour and Meal"). It is possible, and within the merchants' rights, for importers to bring in organic corn and soybean byproducts under conventional harmonized codes—such as cracked corn under "Worked Corn" or soybean cake under "Soybean Oilcake And Other Solid Residues". Noting that the import numbers (reported as organic) are a lower bound, at least 46 percent of total organic corn supply in the United States was imported in 2016 and at least 14 percent in 2019 (see figure 5). The organic soybean market is more heavily dependent on imports; at least 75 percent of supply was imported in 2016 and 63 percent in 2019. Again, it is likely that these figures are an underrepresentation of the share of imports in U.S. supplies of these two organic commodities.

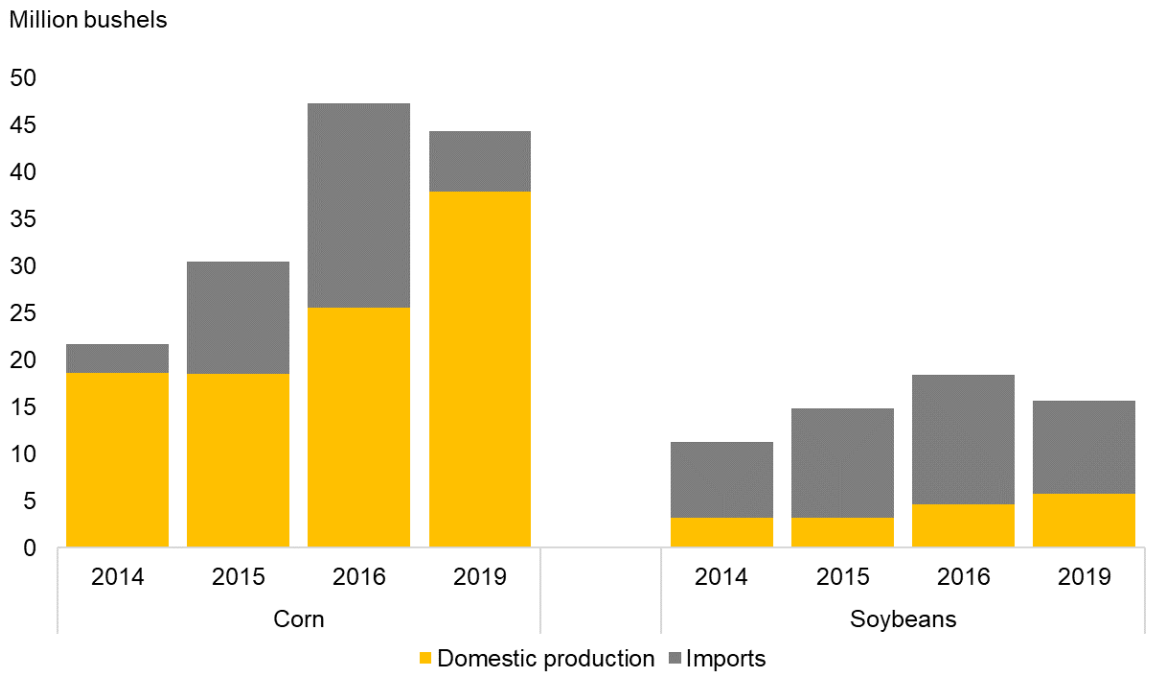
U.S. dependence on a global supply of organic corn and soybeans can be attributed to several factors. Legitimate reasons for import competition include a reluctance among U.S. farmers to transition to organic due to challenges such as achieving high yields, mitigating weeds, or undergoing the USDA organic certification process (McBride et al., 2015); the relative ease of

[2] The Harmonized System is a nomenclature for the classification of traded products, used internationally by customs authorities.

growing organic corn and soybeans in other countries for reasons such as cheaper labor (as organic corn and soybean tend to be more labor intensive) or land; and lower chances of commingling or contamination if conventional corn and soybean are not grown in large scale.

Figure SA5

**Domestic organic production and organic imports of corn and soybeans**




Source: USDA, National Agricultural Statistics Service.

While the competitiveness of organic corn and soybean imports is not debatable, at least some competition may be attributed to illegal acts taking place in exporting countries, such as fraud and dumping. From a consumer point of view, organic food is a credence good—the organic characteristic cannot be ascertained even after purchasing and consuming the product. Fraud in organic corn and soybeans can occur for a variety of reasons, including those as simple as misunderstanding organic regulations or missing documents necessary to show compliance (Ferreira et al. 2021). On the other hand, high organic premiums can create the incentive for deliberate fraud. Fraud is not unique to organic products—with products such as olive oil (Yan et al. 2020), honey (Department of Justice 2015), and fish (Donlan et al. 2019) having received attention for fraudulent activity. A few high-profile cases, both domestic and international, brought added attention to fraud in organic feed markets. In one example, a Missouri farmer pled guilty in 2018 for falsely marketing more than $142 million of corn, soybeans, and wheat as certified organic (Department of Justice 2019).

Internationally, there has been concern regarding Turkish organic corn and soybean imports. Organic corn imports from Turkey rose sharply, more than 2,000 percent from 2014 to 2016, which raised alarms due to the transition process into organic production. Eventually, the NOP suspended the Turkish accreditation agency responsible for a large portion of U.S. organic imports from Turkey for 1 year (USDA AMS 2019). About 70 percent of organic corn and more than 30 percent of organic soybeans were imported from Turkey between 2016 and 2017. Most of this corn and soybeans production originated in countries in the Black Sea region—such as Russia, Ukraine, or Kazakhstan—and was then transshipped to the United States through Turkey. In recent years, Argentina has emerged as a major supplier to the United States of organic corn, while Turkey has lost its relevance. Organic soybean imports are dominated by India, Ukraine, and Argentina. Additionally, Russia supplied 24 percent of U.S. organic soybean imports in 2020. Between 2017 to 2019, India exported about 30 percent of organic soybean, falling to 15 percent in 2020. In 2020, India accounted for 75 percent of U.S. imports of organic flour and meal (1.06 million bushels).

## Recent Changes Could Reduce Organic Imports

The U.S. government has taken several recent steps to change the current environment of organic grains and oilseeds, particularly with respect to unfair competition. In August 2020, NOP proposed the Strengthening Organic Enforcement rule that is currently undergoing the Federal rulemaking process. This rule promotes stronger oversight of production, handling, certification, marketing and sales of organic agricultural products. The rule's explicit purpose is to mitigate organic fraud. The agency would require all organic imports to be accompanied by an NOP Import Certificate, improving oversight and traceability. NOP Import Certificates contain detailed information about a product, including country of origin and quantity. Currently, NOP Import Certificates are only used for countries with organic equivalency agreements with the United States (these countries include Canada, the European Union, Switzerland, Japan, South Korea, Taiwan, and the United Kingdom). The new rule would also clarify conditions for establishing, evaluating, and terminating equivalence determinations with foreign government organic programs.

In January 2021, USDA announced that it would end its organic recognition agreement with India (USDA-FAS 2021). USDA cited lack of oversight over organic certifiers and operations in the country, and provided an 18-month transition period for India-certified organic operations to become USDA-certified. Furthermore, in April 2021, the U.S Department of Commerce

announced the initiation of antidumping duty and countervailing duty investigations of organic soybean meal from India (Commerce 2021). The alleged dumping rate is around 160 percent.

If the rule leads to fewer fraudulent goods in the market, prices are likely to increase. Less supply (from India's agreement being terminated, for example) would likely result in higher prices as well. Prices immediately jumped in January after the agreement terminated, although imports from India continue under the transition period. A situation combining soaring prices for conventional corn and soybeans, with no advance in organic premiums, would result in reduced incentives for additional organic adoption in the United States. In that scenario of stagnant domestic production and lower imports, U.S. organic food processors and livestock producers would face even tighter organic grain supply constraints, with stagnant domestic production and lower imports.

## Organic Premiums are Typically Related to Conventional Market Fundamentals

Organic corn and soybean markets have historically been linked to conventional markets to a great degree. It is not uncommon for niche markets to benchmark prices to the market of related and more heavily traded commodities. Similar supply and demand shocks, and readily available conventional corn and soybean market and price data, have likely led organic prices to be tied to futures prices. The study by Raszap Skorbiansky and Adjemian (2021) revealed that, while organic and conventional corn and soybean are linearly cointegrated, the adjustments back toward equilibrium from a shock to the premium is slow. The authors hypothesize that slow adjustments could be due to challenges in entering the organic market quickly and to increases in organic imports. After an increase to the premium, the authors observe an eventual increase in imports, helping to push the premium down. However, the differing outlooks for organic and conventional corn and soybean had recently eroded the organic premium. The dependence of organic feed crops on imports is counter to the export-heavy conventional markets. Since the run-up of conventional corn and soybean prices, the organic premium dropped sharply. Using the relationship at equilibrium between organic and conventional corn and soybean—with a per-bushel futures price of $6.00 for corn and $15.00 for soybeans—in equilibrium, the market would see an organic corn price of $13.20 and an organic soybean price of $30.20. In May of 2021, organic corn and prices were $9.00 and $24.00 per bushel, respectively. While organic corn prices have remained stable around $9.00 per bushel, the organic soybean price has recently reached $33.00 per bushel.

Continued changes in USDA regulations of organic production—such as the Strengthening Organic Enforcement rule, which limits domestic and import fraud, as well as dumping—could lead to persistent increases in domestic organic corn and soybean prices. In turn, a long-term increase in the premiums could eventually lead to a supply response domestically.

Fewer data sources are available to track the organic feed markets. For up-to-date information on domestic prices, see the bi-weekly National Organic Grain and Feedstuffs Report, published by the USDA Agricultural Marketing Service (AMS). The latest numbers on acreage and production are from USDA National Agricultural Statistics Service (NASS) 2019 Organic Survey, published as part of the 2017 Census of Agriculture. Finally, USDA Foreign Agricultural Service (FAS) Global Agricultural Trade System (GATS) publishes the data on organic harmonized codes for organic corn, soybeans, and soybean flour and meal.

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