



Feed Outlook

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Higher Grain Prices, Strong Global Demand Projected for 2021/22

Strong demand, particularly for exports, is projected to raise 2021/22 feed grain prices from their current 2020/21 estimates. Corn production is projected to increase in 2021/22, but primarily on a return to trend yields (as projected area remains relatively flat), based on the National Agricultural Statistics Service's (NASS) March 31, *Prospective Plantings* report. Domestic corn use is projected to increase in 2021/22, mainly due to higher ethanol fuel use. Exports are projected to be lower than current 2020/21 estimates, as production in competitor countries is expected to recover, but still large by historical standards. Ending stocks are projected to recover in 2021/22, but the stocks-to-use ratio is projected at a relatively tight 10.2 percent.

U.S. 2021/22 corn export prospects face tough competition. Competition from Argentina, Brazil, and Ukraine—whose combined exports are to increase by 19.5 million tons—is expected to weigh down on U.S. exports. On the other hand, U.S. corn export prospects for both 2020/21 and 2021/22 are starting to get support from the current poor conditions in Brazil, as dryness in major producing areas cuts the country's second-crop corn yields. Marketing of the 2020/21 Brazilian crop is going to begin in July-August 2021 and continue through March 2022, affecting export markets going into 2021/22. China, the world's largest foreign producer of coarse grains, is expected to continue to be a leading factor in global coarse grain demand. High prices for sorghum and corn (supported by strong demand from China), provide an incentive for area expansion throughout the world, leading to an increase in projected foreign area and output for both sorghum and corn. Coarse grain production is forecast to be higher than use for the first time in 5 years, leading to a modest increase in stocks.

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Domestic Outlook

Michael McConnell

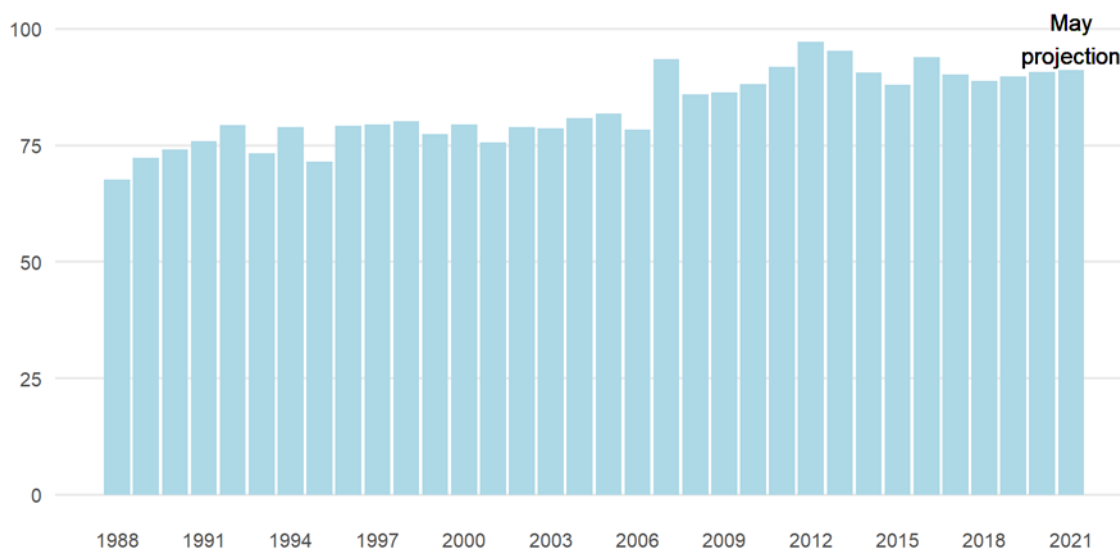
Corn Production in 2021/22 Projected to Increase Due to Return to Yields in Line with Long-term Trends

The May *World Agricultural Supply and Demand Estimates* (WASDE) released the first projection for the 2021/22 corn marketing year, which begins on September 1, 2021 in the United States. Strong market prices are expected to encourage production of corn. Corn production is projected to increase 6 percent in 2021/22, totaling 14,990 million bushels. The National Agricultural Statistics Service (NASS) reported in its March 31 *Prospective Plantings* report that producers intended to plant 91 million acres of corn in 2021. Market prices have increased for corn (as well as for soybeans and other alternative crops) since the survey was conducted in March. NASS's June 30 *Acreage* report, which will provide the first survey-based planted area and harvested area forecast, will be the next important USDA datapoint for area. The current planted area figure is up slightly from 2020/21 planted area.

Figure 1

Corn area planted, United States, 1988 to 2021

Million acres



Source: USDA, National Agricultural Statistics Service.

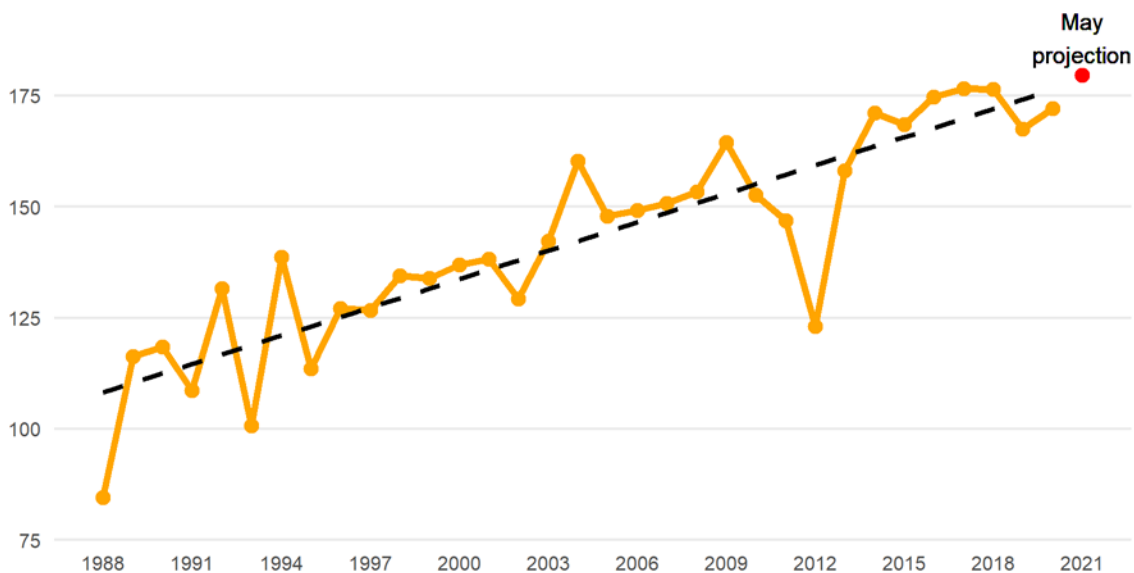
The U.S. corn yield is projected at 179.5 bushels per acre, based on the weather-adjusted trend yield going back to 1988/89. The current forecast assumes normal precipitation and temperate

conditions for July, no extreme deviation from normal precipitation in June, and normal planting progress through mid-May, for the eight States accounted for in the model (Illinois, Iowa, Nebraska, Minnesota, Indiana, Ohio, South Dakota, and Kansas).

Figure 2

Corn yields, United States, 1988 to 2021 projection

Bushels per acre

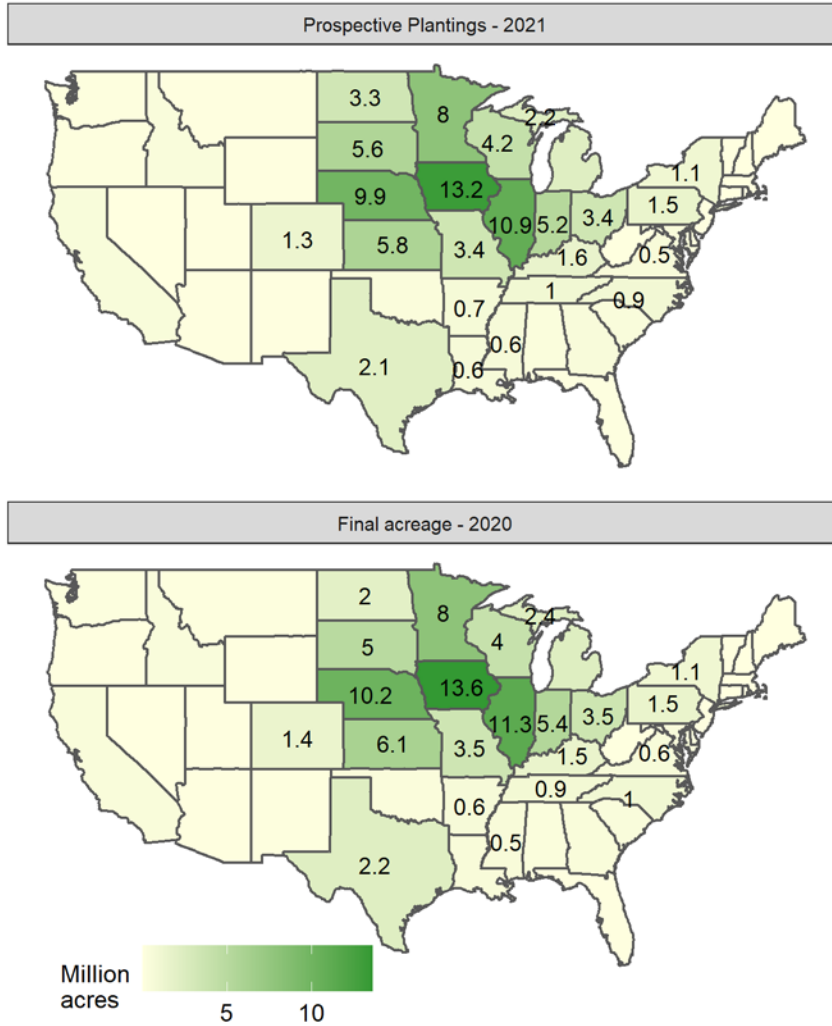


Source: USDA, National Agricultural Statistics Service.

While the U.S. corn planted area is relatively flat, the *Prospective Plantings* report also presented State-level insight of planting decisions by producers. Producer surveys indicate that corn area is expected to decline in significant Corn Belt States—such as Iowa, Illinois, and Nebraska—as these States reported increased soybean planted acre intentions. There is expected to be strong competition for planted area around the country, particularly between corn and soybeans, due to tight national and global markets for both commodities. Producer intentions' indicate increases in the Northern Plains and Lower Mississippi River States, however, likely due in part to strong export demand and high prices for corn in the Gulf and Pacific Northwest port markets.

Figure 3

U.S. corn planted area, 2020 vs. 2021 crop marketing year



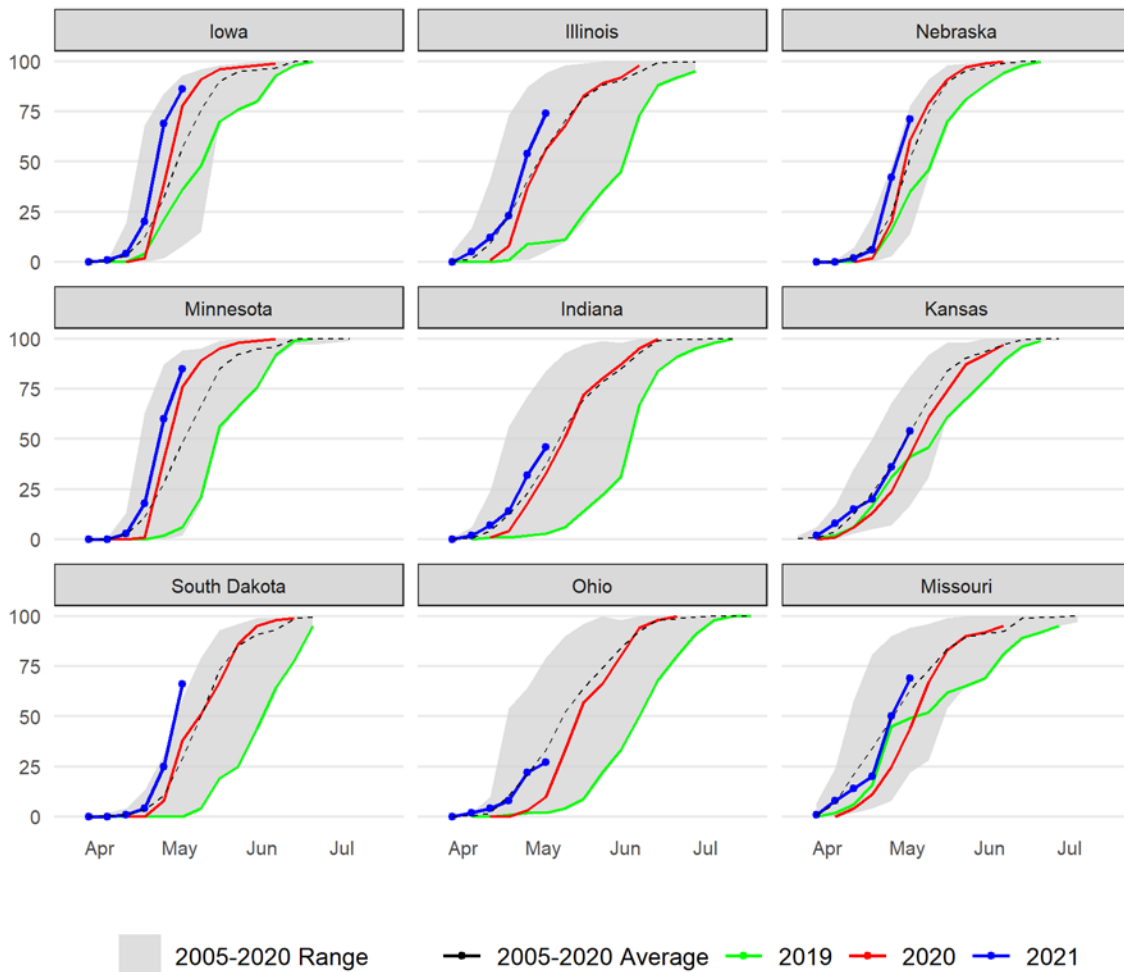
Source: USDA, National Agricultural Statistics Service.

Temperature conditions have varied thus far into the planting season, with some cold weather snaps occurring during April. In addition, there have been close monitoring of drought conditions, primarily in the Southwest and Western regions of the United States. Moderate to severe drought conditions have encroached on the Western and Northern Plains and on some limited areas of the corn belt, according to the latest Drought Monitor maps published on May 4. Planting progress has moved at a steady clip through the early part of the season. Through May 9, planting progress was at an above-average pace for most of the major corn-producing States—particularly West of the Mississippi River and in the Northern regions of the corn belt. Early indications show a smooth planting season thus far.

Figure 4

Corn planting progress by State, 2005 to 2021

Percent complete



Source: USDA, National Agricultural Statistics Service.

Farm Prices for Corn Projected Higher for 2021/22, Led by Strong Demand and Elevated Cash and Futures Prices

The season-average farm price for corn is projected to total \$5.70 per bushel in 2021/22. This projection is up from the 2020/21 estimate of \$4.35 per bushel—which was raised \$0.05 in the May WASDE, due to higher reported prices received by farmers through May.

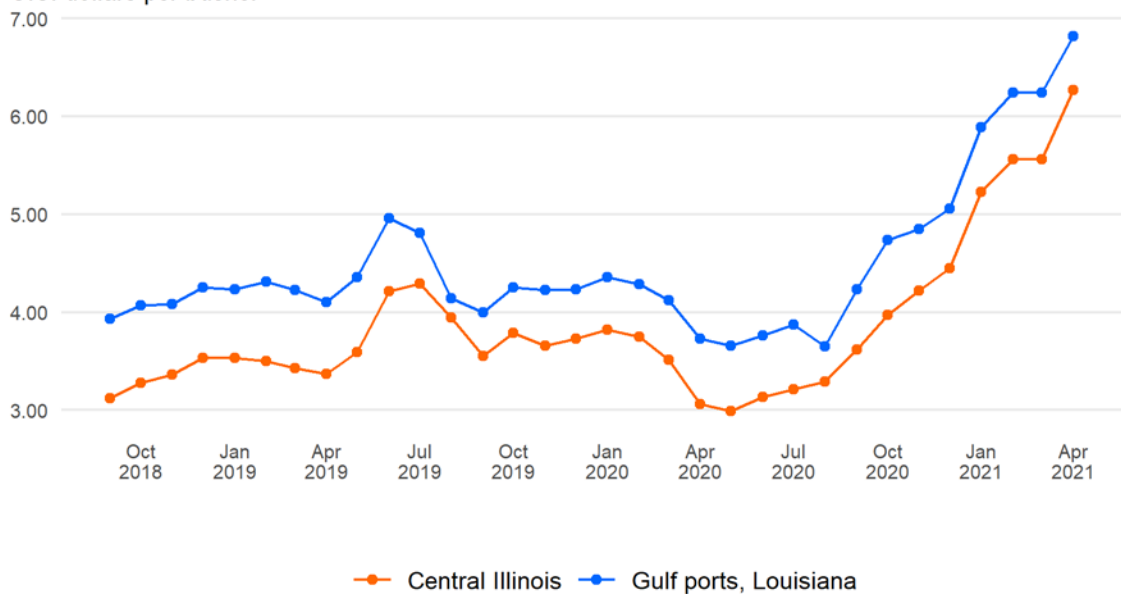
Cash and futures market prices for corn began rising significantly in the late summer of 2020 and have remained at elevated levels through early 2021 (see the [special article](#) on China's feed grain market in this report for more discussion). In April, cash prices jumped up again, primarily due to a tightening production outlook in South America and continued strong global demand. The average Central Illinois cash corn price in April exceeded \$6.00 per bushel for the

first time since July 2013. Marketing-weighted farm prices have also been increasing, although they have lagged behind the increases witnessed in the cash and futures market. These increases are due to producers marketing grain at prices set earlier in the year before the price increases had fully materialized. Additionally, since producers have marketed and delivered the majority of the 2020/21 crop, subsequent months will have less influence on the 2020/21 season-average farmer price. Similarly for 2021/22, the season-average farm price is expected to be influenced by producers that have contracted their new crop for delivery during the fall and winter, at prices based on recent market levels. Prior to the May WASDE, forward prices for fall delivery were close to or above \$6.00 per bushel in numerous locales throughout the Corn Belt.

Figure 5

U.S. cash market prices for corn, monthly average

U.S. dollars per bushel

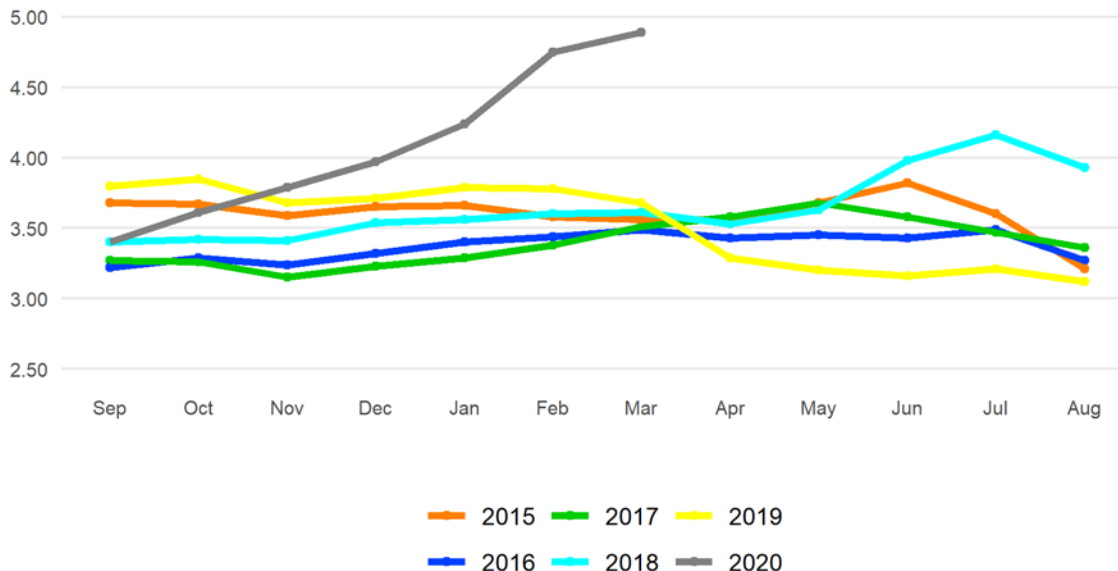


Source: USDA, Agricultural Marketing Service.

Figure 6

Price received for corn, monthly

U.S. dollars per bushel



Source: USDA, National Agricultural Statistics Service.

Food, Seed, and Industrial Use Higher for 2021/22 Due to Higher Expected Fuel Use

Food, seed, and industrial use of corn are projected to be 6,615 million bushels for 2021/22, a 3-percent increase from the current 2020/21 estimate. The increase is largely due to a 5-percent projected increase in ethanol fuel use—totaling 5,200 million bushels. The current fuel ethanol projection would be a substantial increase from the recent COVID-19 affected years, still below the 2018/19 mark of 5,378 million bushels, however. As U.S. drivers resume commuting patterns and road travel (with vaccine rates increasing), and social distancing policies normalizing or being eliminated in some regions of the country, ethanol production and demand are expected follow suit. Longer-run trends of more fuel-efficient vehicles and fewer miles driven, per capita, also continue to be factors for the corn used for ethanol outlook.

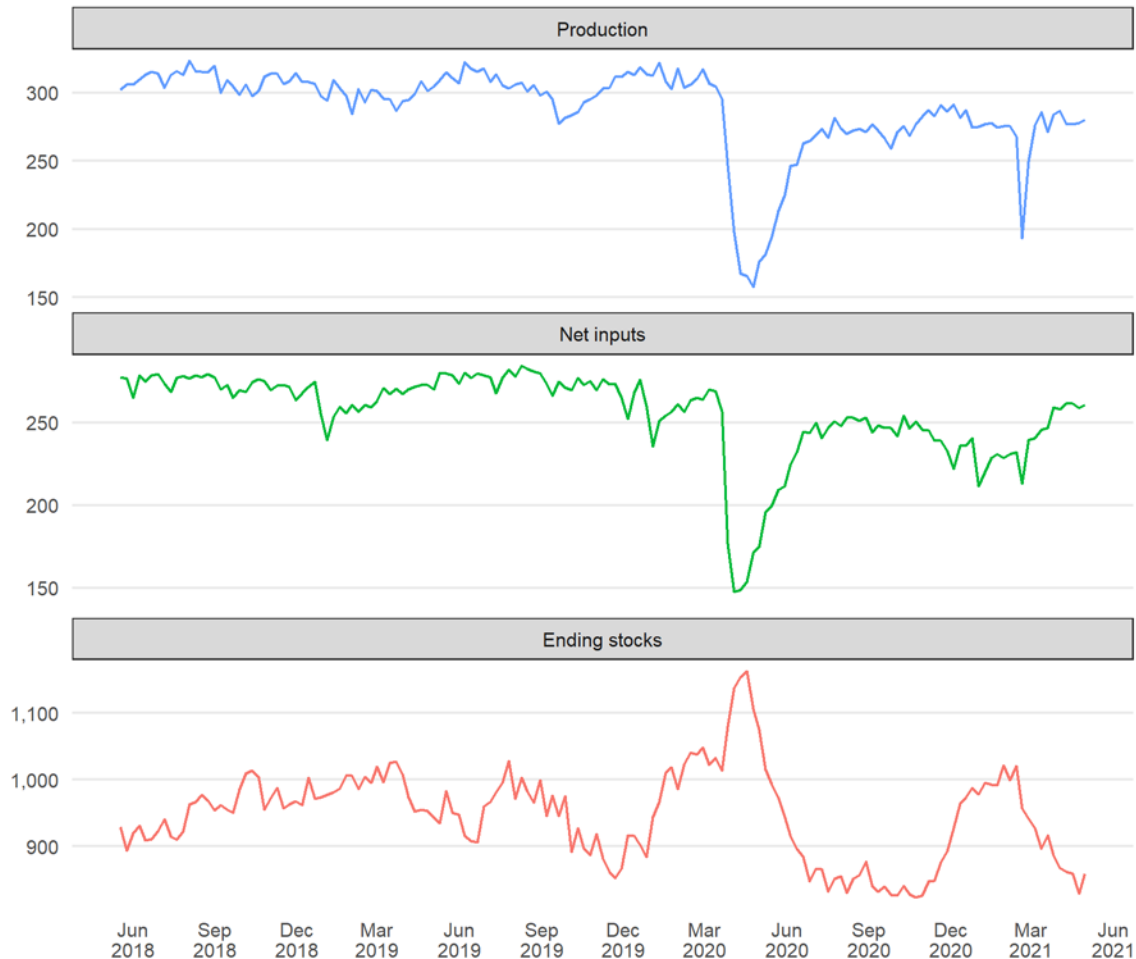
Corn used for fuel ethanol in 2020/21 is estimated at 4,975 million bushels—unchanged from the April forecast. Energy Information Administration (EIA) data has shown recent improvements in the motor gasoline product supplied, and the Reformulated Blendstock for Oxygenate Blending (RBOB) price has also steadily increased since the New Year. These indicators point toward continued recovery in gasoline demand, as vaccination rates have increased this spring. This has resulted in higher levels of ethanol net input use (a proxy for

ethanol delivered to market) and lower ending stocks sitting in inventories. Ethanol production and net input levels remain considerably lower than pre-pandemic levels, however. Additionally, higher corn prices and indications of limited availability of corn, particularly during the summer months leading up to the new crop's harvest, may constrain ethanol producers' margins and utilization rates for the marketing year.

Figure 7

Weekly totals of U.S. ethanol production, net inputs, and ending stocks

Million gallons



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

Large Animal Inventories Keep Feed and Residual Use Relatively High, Despite Rising Feed Prices

Relatively large animal inventories are expected into the 2021/22 corn marketing year. Feed and residual use is projected to be 5,700 million bushels, level with current 2020/21 estimates. Less cattle on feed is expected for the 2022 calendar year, but this is offset by

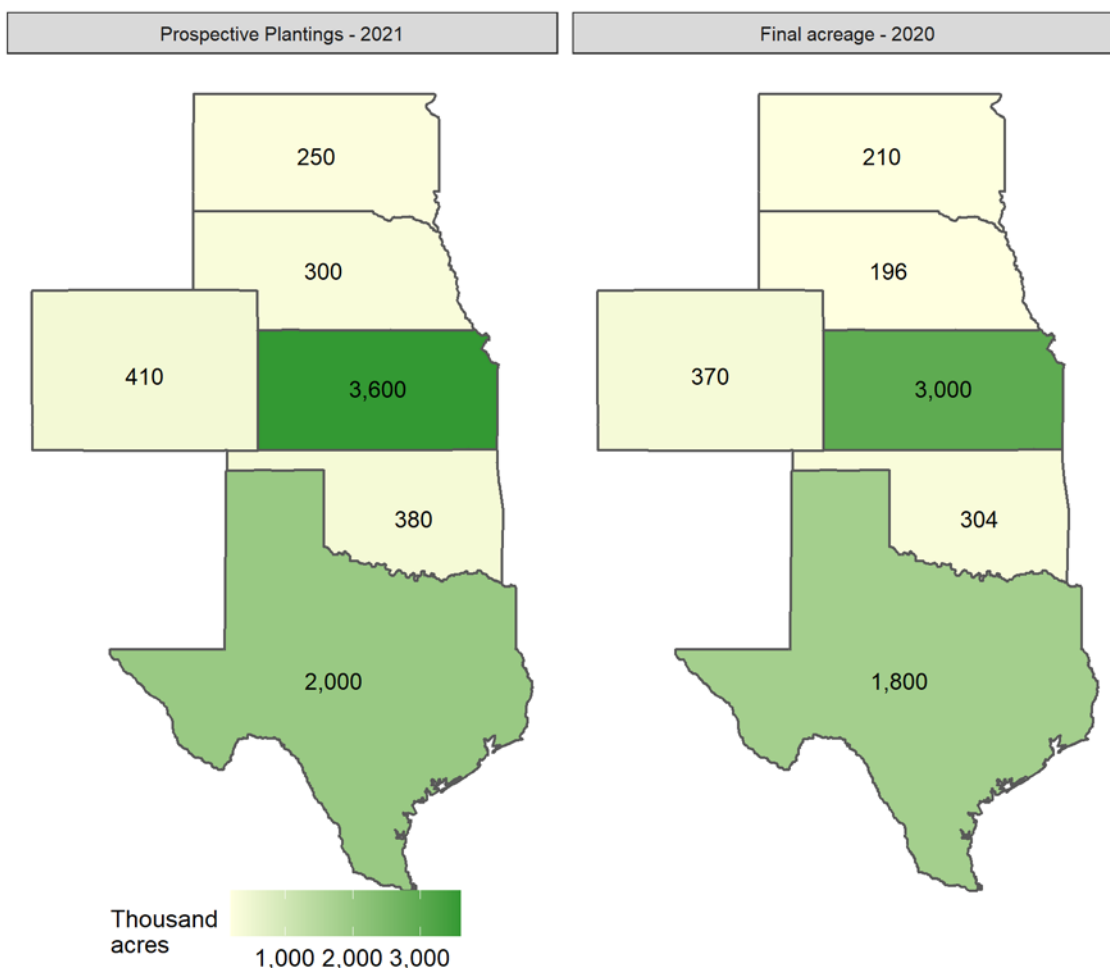
additional demand from the hog and poultry sectors. As measured by ERS's grain-consuming animal units (GCAUs), indicated feed demand is effectively unchanged from the previous year, at 101.7 million units for 2021/22. Additionally, the increase in ethanol production is expected to increase the available dried distillers' grains (DDGs) available in the market. Feed demand could be affected by developments in drought conditions, particularly if severe drought persists or spreads into the Western Plains that account for a large portion of the U.S. cattle herd. Current projections assume normal weather conditions for the remainder of the spring and summer, however.

Increased Sorghum Area Projected for 2021/22, Responding to Continued Strong Export Demand

U.S. sorghum production is projected to be 427 million bushels in 2021/22, compared with the previous year's total of 373 million bushels. NASS reported that producers expected to plant 6.9 million acres of sorghum for the outyear—an 18-percent increase from 2020/21 planted area. The increased planting intentions were reported throughout all the major sorghum-producing States, including the two major-producing States of Kansas and Texas. Sorghum yield projections for 2021/22 are based on the 20-year median, at 68.9 bushels per acre, which is lower than the previous year's crop of 73.2 bushels per acre.

Figure 8

U.S. sorghum planted area, 2020 vs. 2021 crop marketing year



Source: USDA, National Agricultural Statistics Service.

Sorghum use is also projected higher for 2021/22, totaling 425 million bushels—a 10-percent increase from current 2020/21 estimates. The increase is entirely due to higher exports, projected at 350 million bushels. Sorghum exports are estimated to total 305 million bushels for 2020/21, up 5 million bushels from the April forecast, due to an increased pace of shipments to China. That trend is expected to remain into 2021/22. Additional discussion on sorghum trade is in the International Outlook section of this report.

Domestic sorghum use in 2021/22 is projected at 75 million bushels. Most domestic use of sorghum is for feed and residual use—totaling 65 million bushels of the outyear projection. Sorghum for food, seed, and industrial use is projected at 10 million bushels, including 8 million bushels used for fuel ethanol. Since U.S. and global sorghum prices began increasing during the summer of 2020, minimal amounts of sorghum used for fuel ethanol have been reported in

recent months—with NASS not able to publish the monthly totals due to disclosure constraints. Furthermore, the May 2021 NASS *Grain Crushings* publication reported zero use of sorghum for March. With market fundamentals expected to be similar in 2021/22, de minimis levels of sorghum used for fuel are expected to continue into the new crop year.

For 2020/21, domestic sorghum use estimates are lowered 5 million bushels to 70 million bushels, with exports estimates raised the corresponding amount to 305 million bushels. This is based on continued strong shipments in the Census data through March, with April grain inspections data being reported by the Agricultural Marketing Service (AMS). The continued strong pace of exports is primarily driven by shipments destined for China.

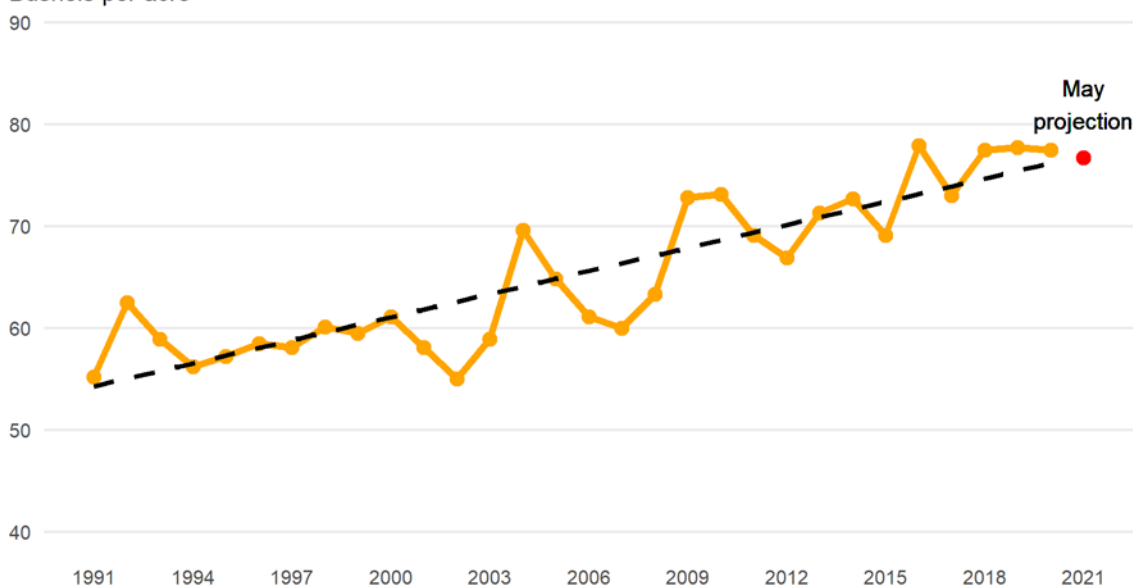
Barley Prices Projected Higher in 2021/22 Due to Higher Overall Feed Grain Prices

Barley production is projected to be 161 million bushels for 2021/2022, a 2.6-percent decline from 2020/21 production estimates. NASS reported that 2.590 million acres of barley are expected to be planted by producers in its March *Prospective Plantings*. This is a slight decline from the 2.621 million acres that were planted the previous year. With yields projected at 76.7 bushels per acre based on trend—compared with 77.5 bushels per acre for the 2020/21 crop, and imports the same as the previous year—total supplies are projected to be 2.0 percent lower than the previous year.

Figure 9

Barley yields, United States, 1988 to 2021 projection

Bushels per acre



Source: USDA, National Agricultural Statistics Service.

U.S. barley use is projected to also decline in 2021/22—from 173 million bushels estimated for 2020/21 to 168 million bushels projected for 2021/22. The decline is forecast to come from less feed and residual use—15 million bushels projected in 2021/22, compared with 20 million bushels estimated for the prior year. Food, seed, and industrial use (141 million bushels) and exports (12 million bushels) are unchanged from the current 2020/21 estimates.

Barley ending stocks in 2021/22 are also projected to remain level with 2020/21 estimates, totaling 80 million bushels. The average farm price for barley is projected to increase from \$4.75 per bushel in 2020/21 to \$5.95 in 2021/22, based on higher overall price levels for feed grains in the upcoming year.

Tighter Oat Supplies and Higher Prices Projected for 2021/22

Oat production is also projected to decline in 2021/22 from 2020/21 levels—from 65 million bushels in 2020/21 to 53 million bushels projected for 2021/22. NASS reported that producers expected to plant 2.488 million acres of oats in 2021/22, compared with 2.984 million bushels planted the year prior. Oat yields are projected to be 66.3 bushels per acre, based on trend—up from the 2020/21 crop of 65.1 bushels per acres. Total supply for 2021/22 is projected to be 188 million bushels, a 2-percent decline from the 2020/21 estimate, with imports projected to be higher in the outyear.

U.S. oat use is projected to be 157 million bushels, a 3-percent increase from 2020/21 estimates. Domestic use is projected to be higher than the previous year, with year-over-year increases for feed and residual (75 million bushels) and food, seed, and industrial (80 million bushels). Exports are projected to be 2 million bushels, down slightly from the 2020/21 estimate of 3 million bushels.

Lower supplies and higher use result in ending stocks projected to be 22-percent lower than in 2021/22—from 40 million bushels in 2020/21 to 31 million bushels in the out year. Tighter supplies and higher overall feed grain prices result in average farm prices projected to increase from \$2.75 per bushel in the current year to \$3.60 projected for 2021/22.

Change to Poultry Animal Unit Methodology

Michael McConnell

Change to Calculation of Poultry Inventories for Feed Consuming Animal Units Results in Minor Revisions to Series

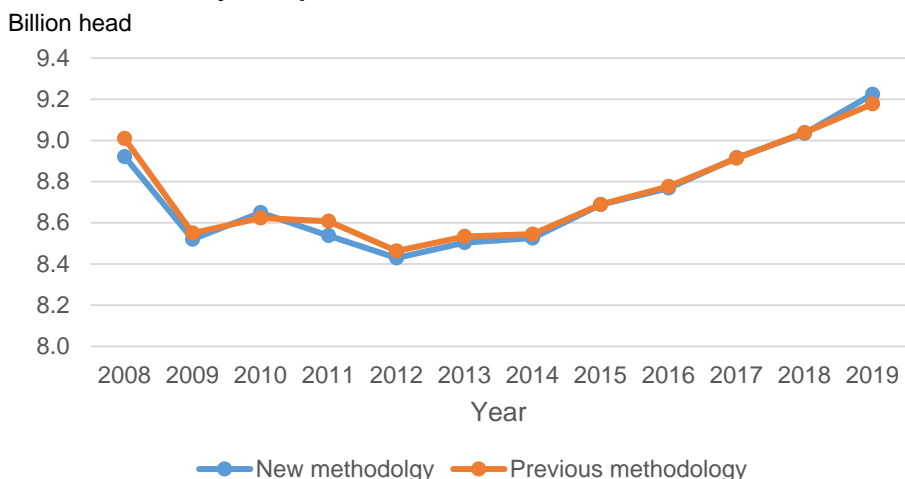
Beginning in May 2021, ERS's feed consuming animal unit indices will be revised to incorporate a new methodology for estimating broiler and turkey inventories. Inventory numbers are then, in turn, converted into: grain-consuming animal units (GCAU), high-protein animal units (HPAU), roughage-consuming animal units (RCAU), and grain and roughage-consuming animal units (G&RCAU), with each unit series using established feeding factor coefficients (See *Feed Outlook*, May 2013 FDS-13e/FDS-13eSA).

The change for the poultry component of these indices is that the inventory numbers will now be based on the National Agricultural Statistic Service's (NASS) Federally Inspected (FI) Slaughtered data series, published in its monthly *Poultry Slaughter* report. Previously, broiler and turkey inventories were based on the annual *Poultry – Production and Value (PV)* report's production data. The benefits of this change in methodology are expected to be: lower latency in reported data; better monitoring of mid-year data by moving from an annual to monthly series; and better alignment with USDA's U.S. Quarterly Animal Product Production forecasts in the monthly WASDE, which tracks and forecasts Federally Inspected poultry production.

FI slaughter only accounts for animals that are produced and processed in facilities that are inspected by federal regulators, and thus can participate in interstate commerce for their products. This encompasses the great majority of total commercial production, although it does exclude some U.S. broiler and turkey production.

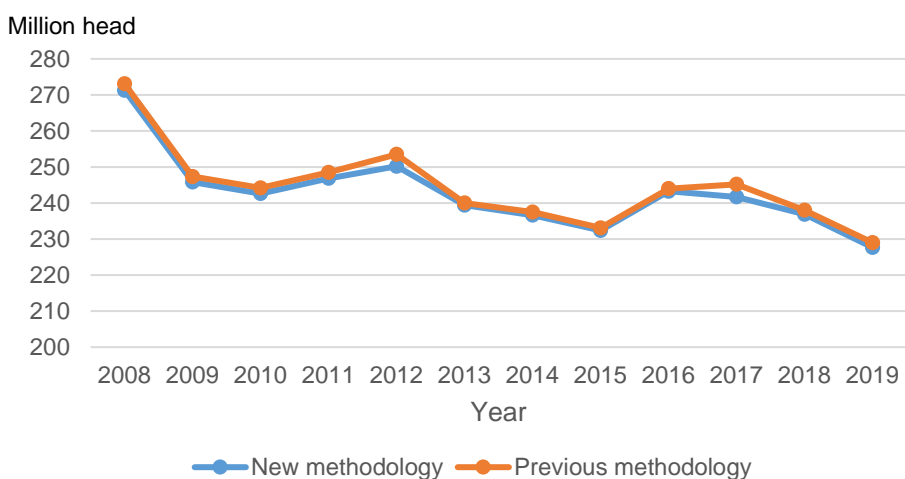
The change in methodology will result in revisions to a historical series of the ERS feed-consuming animal unit indices, due to the change in inventory source. These changes will be minor in scale, relative to the entirety of the index. For broilers, the difference between the FI and PV inventories averaged about 17 million head per year between 2008 and 2019, where FI production ranged between 8.5 and 9.3 billion head. That means the change to inventories represents a 0.2 percent reduction, on average. For turkeys, the average difference during the same period was about 1.6 million head per year, of a total of 243 to 271 million head on an FI-basis—or an average annual reduction of inventory of 0.7 percent relative to the previous methodology.

Figure 10
Broiler inventory comparison



Source: USDA, Economic Research Service.

Figure 11
Turkey inventory comparison

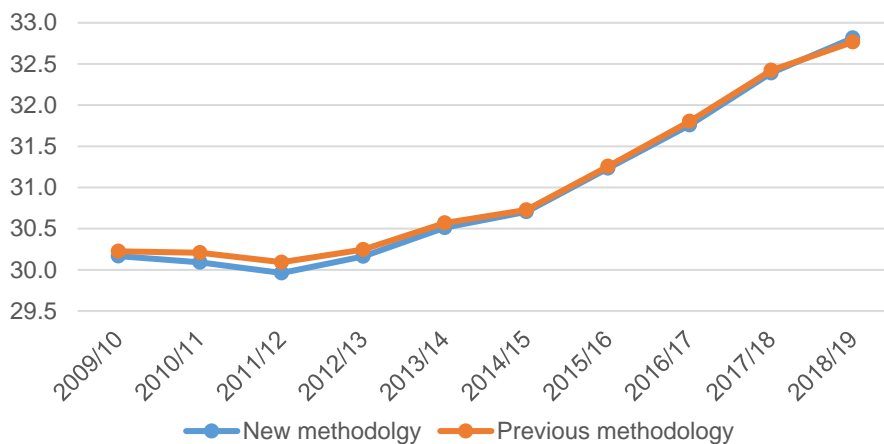


Source: USDA, Economic Research Service.

Translating these changes of inventories to feed-consuming animal unit indices result in revisions that are similar in direction and in magnitude. The updated poultry component of the GCAU is reduced 50,000 units between 2009/10 and 2019/20—where the poultry GCAUs, based on current calculations, averaged about 31 million units over that period. Relative to the total GCAU historical series, these revisions accounted for changes ranging from 0.14 percent lower to 0.05 percent higher than the previous methodology.

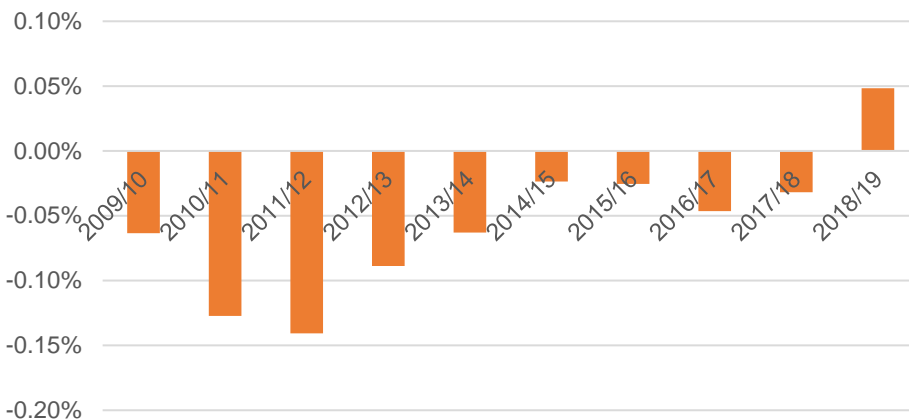
Figure 12
Poultry grain-consuming animal units (GCAUs)

Million units



Source: USDA, Economic Research Service.

Figure 13
Percent change in total grain-consuming animal units (GCAUs)



Source: USDA, Economic Research Service.

The objective for the change to the animal unit index methodology is to provide improved measurement and forecasting due to lower data latency, higher reporting frequency, and greater consistency with official USDA livestock and meat forecasts. The change does require revisions to historical data. Given the objective of the series to provide an estimated indicator of feed use, the changes are relatively minor in scale for both the poultry and total components of these indicators—within the typical deviation caused by rounding.

International Outlook

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Record-High Coarse Grain Production Projected for 2021/22

Global coarse grain production in 2021/22 is projected to reach a record of 1,495.9 million tons, up 4 percent or 58.5 million tons from the previous year. Note that the May initial assessment of world coarse grain supply and demand in 2021/22 is highly tentative, as spring planting is still underway in the Northern Hemisphere and months away in the Southern Hemisphere, where the 2020/21 crop is still being harvested.

High relative prices for **corn**, supported by strong demand from China ([see the special article on China below](#))—and, on the supply side, by poor harvest results in Ukraine in the fall of 2020, and by reduced prospects for the 2020/21 second-crop corn harvest in Brazil—are expected to incentivize corn area expansion in 2021/22. Global corn area is projected to increase by 1.1 percent. The largest increases are projected for Brazil, which continues to expand its second-crop corn area—and for China, where domestic prices for corn continue to break records. Partly offsetting this projection is a reduction in Angola, where the worst drought in 40 years is expected to reduce area harvested. Smaller year-over-year changes are made for numerous countries.

Sorghum area is expected to increase by 3.1 percent in 2021/22, with robust demand from China (that uses sorghum as one of its substitutes for corn) supporting high prices. Sorghum area is projected higher in the United States, India, and Argentina, among other countries.

Barley area in 2021/22 is projected slightly down as prices, although at their highs, are relatively less attractive than prices for competing crops. The largest decline in barley area is projected for Australia (where barley competes with wheat and canola) and for the United Kingdom (U.K.), as the country moves from an unusual weather-related boost in barley area last year, to an average-size area this year. Barley area is projected higher in Canada and Argentina, supporting these countries' growing exports to China.

For most countries, coarse grain **yields** are projected at trend levels that imply normal weather—average precipitation and temperatures. However, for autumn-planted coarse grains such as winter barley in the Northern Hemisphere, yield prospects can be better assessed. Crop yields are expected to be affected by the drought across western parts of the Middle East, a good start of the spring season in North Africa, and decent conditions in the European Union (EU)—where 2/3 of the barley is winter-planted.

The average world coarse grain yield in 2021/22 is projected to reach a record 4.38 tons per hectare, up almost 3.0 percent from last year. An assumed return to trend from low yields in 2020/21 pushes foreign yields for corn 3.5 percent higher for the United States, Brazil, Argentina, and the Ukraine (and a number of other countries). Sorghum yields are also projected higher—mainly due to sorghum recovery in Australia and Sub-Saharan Africa—despite lower projected yields for the United States, which returns to the 20-year-median yields. On the other hand, barley, oats and rye yields are projected lower—mainly due to the Australian and Argentine retreat to trend after a bumper year.

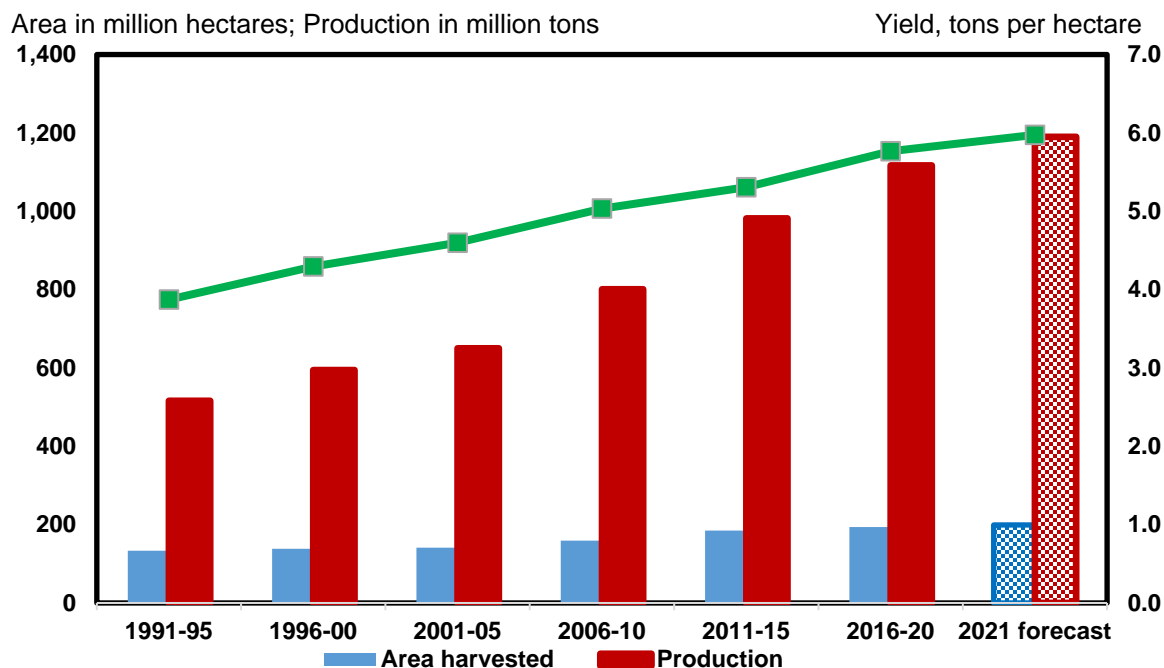
U.S. coarse grain production in 2021/22 is projected 21.6 million tons higher, up by 5.8 percent, while **foreign** production (global minus the United States) is expected to increase by 36.9 million tons, or by 3.5 percent. The expected second-highest ever U.S. corn crop underpins the growth in 2021/22 world corn production. However, foreign (global minus the United States) corn grain production is also expected to expand to a record-high, reaching 809.1 million tons, up 5.3 percent year-to-year. A steep increase in global sorghum production takes it to a near-record of 65.2 million tons, up 2.9 million or 4.6 percent. For barley, oats, and rye—output is projected lower than last year, because of reduced area and yield.

USDA monitors production of various commodities in more than 200 countries, the data being recorded and continuously updated by the Foreign Agricultural Service (FAS) and reflected in the *Production, Supply, and Distribution database*. The most important developments in the new forecast for major commodities are published in the FAS “**World Agriculture Production**” report.

See figure 14 for a graphic display of the global corn area, production, and yields

Figure 14

World corn area, production, and yield: 5-year averages and a forecast for 2021

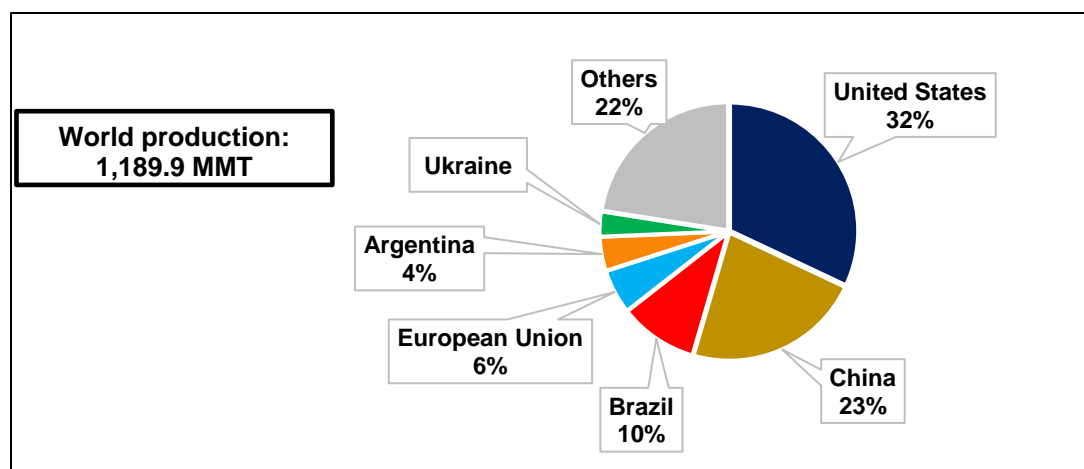


Source: USDA, Foreign Agricultural Service, *Production, Supply, and Distribution database*.

Global **corn production** is dominated by 6 countries (regions) that produce almost 80 percent of the world’s corn. The United States is the top producer, though its world output share (that used to be above 40 percent) has been under 35 percent since 2010. During the same period, the combined corn production share of Brazil and Argentina has increased from 10 to 14 percent.

Figure 15

World corn production by country (shares)

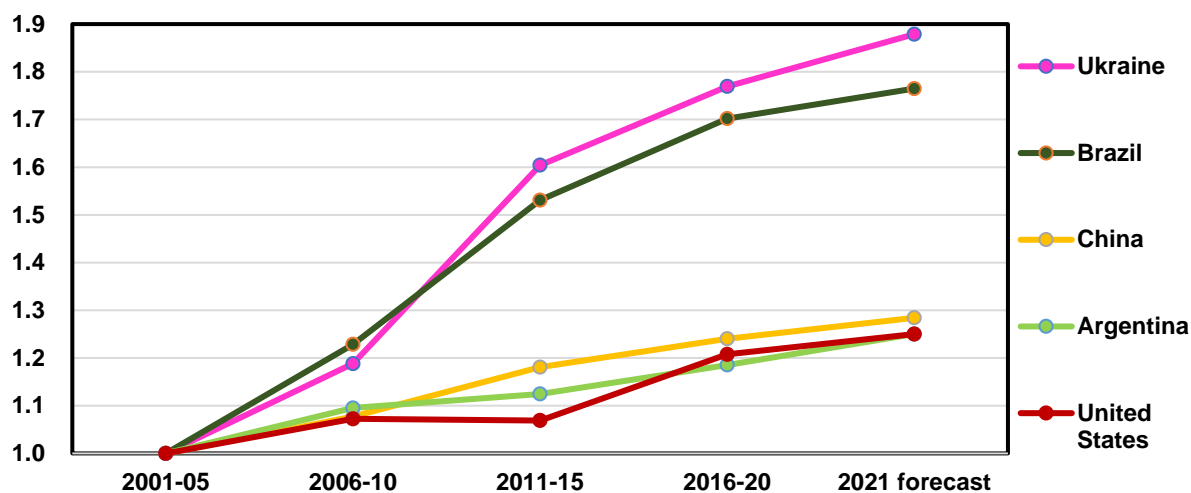


Note: MMT – Million metric tons.

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

Over time, corn yields change unevenly among the largest corn producers, with the fastest growth in Ukraine and Brazil, although from a lower base. However, even with a strong yield trend—in absolute terms, corn yields in these two countries are lower than in Argentina and are significantly below U.S. levels. Among these major producers, the projected corn yield in Brazil is still the lowest, followed by Ukraine.

Figure 16
Corn yield grows the fastest in Ukraine and Brazil
 Index



Note: 2001-05 average equals one.
 Source: USDA, Foreign Agricultural Service, *Production, Supply, and Distribution database*.

The **South America region**, one of the most dynamic and fast-growing corn producers in the world, is forecast to increase coarse grain area by 5.3 percent and produce 197.7 million tons of coarse grains in 2021/22, 22.4 million tons higher than in 2020/21. Corn is the region’s dominant grain—and the major corn-producing countries in the region, **Brazil** and **Argentina**, are expected to plant record-high corn area, supported by exceptionally high corn prices. The countries’ trend in corn yields is strong, but they are also prone to extreme weather conditions that affect yields, in particular the second-crop corn in the Center-West of Brazil.

A return to trend yields after a lackluster 2020/21 year for both countries takes Brazilian corn production up by 9.0 million tons to 118.0 million, while Argentine corn output is projected 8.0 million tons higher to reach 51.0 million. Brazilian farmers are expected to continue to expand area of their low-cost second-crop (safrinha) corn, given the large pool of land in the Cerrado (Center-West), available for double cropping with soybeans. Growers (especially large farms) are investing into improving productivity and limiting weather-related risk for example by using

shorter-season hybrids. The first-crop corn area, which is about one-fifth of total planted area, was declining for about 25 years. and currently stabilized at just above 4 million hectares. This decline didn't offset the expansion of safrinha area, as there are few limitations on area expansion in the Center-West. The smaller South American corn producer, **Paraguay**, is exporting corn to the neighboring feed-deficit south of Brazil, where many Brazilians farmers own and farm land. Paraguay is also expected to increase corn area and output further to record highs.

Coarse grain production in **China**, the largest foreign producer of coarse grains, is expected to increase 7.4 million tons in 2021/22 to a record of 275.4 million tons—with higher area and record-high projected yields, and corn is dominating the country's coarse grain output. China is forecast to increase area planted to corn by almost 2 percent (0.7 million hectares), driven by relatively high domestic prices and reinforced by Government policies promoting an increase in corn acreage. Corn output is projected to reach a new record of 268.0 million tons.

The **European Union (EU)** is forecast to produce 0.8 million tons more of coarse grain to reach 153.9 million in 2021/22. Higher corn output, with a return to trend yield in the large corn-producing countries that suffered from hot and dry summer conditions in 2020/21 (such as **France, Romania, and Bulgaria**), is partly offset by lower oats and mixed grain production. The **United Kingdom**, a former member of the European Union and a major barley producer, is projected to reduce barley area and production. This is a return to normal for the United Kingdom, from last year's weather-related large expansion of barley area, after excessive rains thwarted wheat planting.

Coarse grain production for **Sub-Saharan Africa** for 2021/22 is estimated up 2.2 million tons year over year, to a record of 129.0 million. The southern part of the African continent has been enjoying great crop conditions with plentiful timely rains. The largest 2021/22 coarse grain production increase in that part of the world is for **Zimbabwe**, expected to triple its crop, up 2.0 million tons to 2.7 million, with record corn and sorghum yields based on weather through early-May. With higher projected area for corn and sorghum, coarse grain output is up 1.2 million tons in **Nigeria**. However, in **Angola**, located further west, the worst drought in 40 years cut harvested area and output by a third and reduced corn production by 0.8 million tons to 1.5 million. There are multiple changes to 2021/21 coarse grain prospects for **Burkina, Malawi, Mali, Mozambique, Tanzania, Zambia** (among others). The largest corn producer, **South Africa**, is projected to have a crop of 17.0 million tons, unchanged from the record-high of the previous year.

Ukraine's coarse grain production in 2021/22 is forecast up 26 percent to 48.9 million tons, with higher area and yields. Corn area is expected 2 percent higher at a record of 5.5 million hectares, although the small country is approaching its limit for arable land with higher area projected for all crops—coarse grain, wheat, and oilseeds—and with a small winter kill of fall-planted crops. Corn yields are expected to rebound from drought a year ago, boosting corn production 7.2 million tons to 37.5 million, 4.5 percent above the previous record in 2019/20.

In **India**, where most coarse grains bar corn are used for food, a year-over-year reduction in production of 1.1 million tons—to a total of 48.1 million tons—is expected in 2021/22, with higher coarse grains area (but lower corn area) and a return to trend yields from last year's highs. The 2020 monsoon rains were beneficial for last year's summer crops, while the 2021 monsoon season (expected to begin in September) will be critical for the current production forecasts.

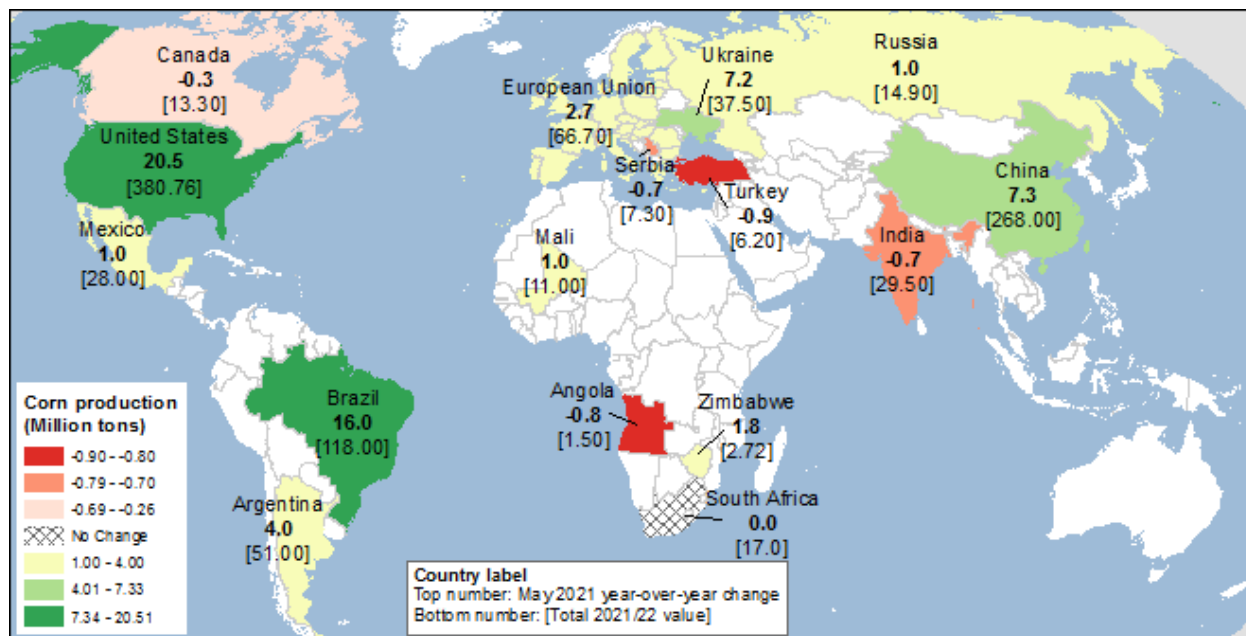
Canada is projected to produce 30.9 million tons of coarse grain in 2021/22, up 1.2 million. Planting intentions reported by Statistics Canada indicate higher coarse grain area at the expense of wheat, with increased area for barley, though lower area for oats.

Middle East coarse grain production in 2021/22 is projected down 15 percent to 21.7 million tons. Winter grains in **Turkey's** Central Anatolian Plateau suffered from drought and heat. While barley area for Turkey is unchanged, forecast yield is reduced, dropping production 1.1 million tons to 7.0 million. In parts of **Iran** and **Syria**, a drought is devastating crop production, with coarse grain output forecast down 14 and 40 percent down, respectively.

North Africa's coarse grain production is expected to increase 16.6 percent in 2021/22 to 12.3 million tons. **Morocco's** barley yields are projected sharply higher (almost quadrupled), with abundant winter rainfall boosting production by 1.8 million tons to 2.4 million. Barley yields and production are also up for **Tunisia**, but down for **Algeria**.

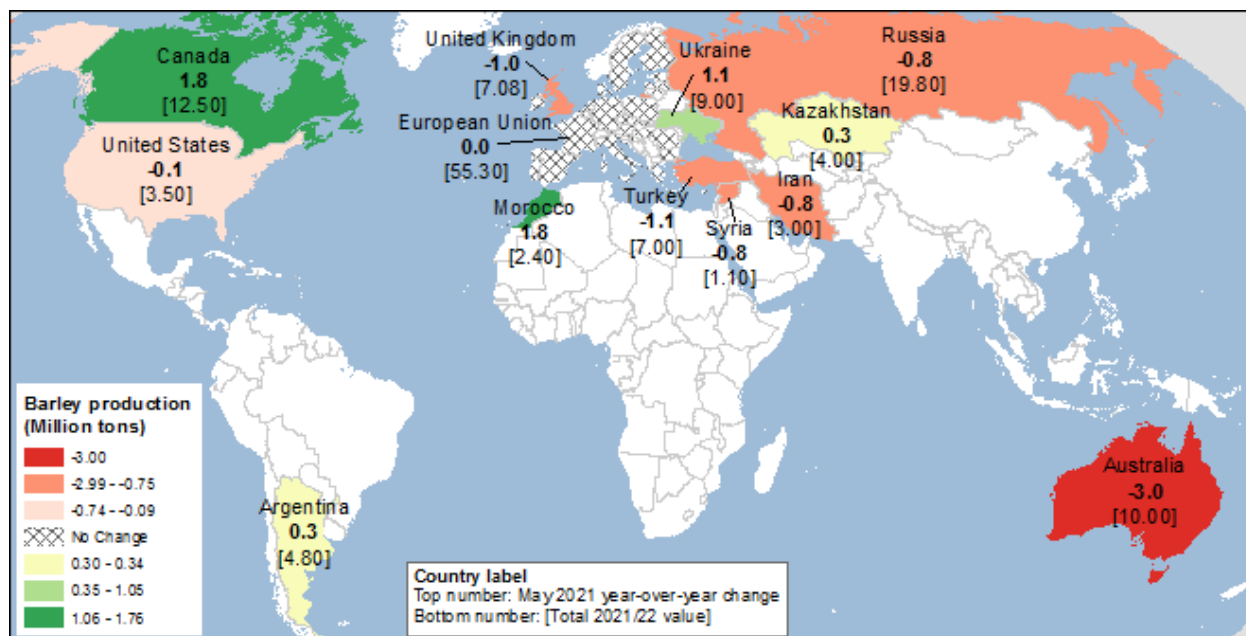
Maps A1 and A2 below visually present the forecast for major corn and barley producers, and year-over-year changes in projected corn and barley output.

Map A1 – Major changes in corn production for 2021/22



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

Map A2 – Major changes in barley production for 2021/22



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

Changes in Brazil Cut 2020/21 Production Forecast

Global coarse grain production for the current year 2020/21 is forecast at 1,437.4 million tons, down 8.5 million this month because of a substantial cut in corn output in Brazil.

While 2020/21 harvests in the Northern Hemisphere were generally completed months ago, important Southern Hemisphere crop volumes are in critical stages of development. Brazil's 2020/21 second-crop (safrinha) corn is currently going through key reproductive stages. Extensive dryness is hurting yield prospects in southern Brazil, with dryness in Parana and Mato Grosso do Sul (unusual for this time of year as southern Brazil would normally expect subtropical rains during the months of April and May), in contrast to the Center-West which has a tropical wet and dry season. April of 2021—a critical month for development of the safrinha crop—was unseasonably warm and dry, with virtually no precipitation in both Parana and Mato Grosso do Sul, the two southern states that produce about a third of second-crop corn in Brazil. In the Center-West, specifically in the states of Mato Grosso and Goias, the rains in April were insufficient and are coming to an end earlier than expected, although the northern Mato Grosso had some extra rain before the end of April. With crop ratings dropping every week, the forecast for the average corn yield is reduced 6.4 percent to 5.18 tons per hectare, while corn production is cut 7.0 million tons to 102.0 million.

The *USDA interagency committee* carefully reviews **Sub-Saharan Africa's (SSA)** production projections and prior year estimates twice a year, and this month included such a review. Coarse grain production for 2020/21 is estimated 1.7 million tons lower to 126.8 million, with multiple changes across the region. The largest 2020/21 coarse grain production change is for Nigeria, down 1.8 million tons to 6.8 million, with lower reported corn and sorghum area. In Angola, where corn is the main crop, production is slightly up with much higher area, but with reduced yields because of drought. Multiple smaller partly offsetting changes are also made to 2020/21 coarse grain prospects in the region.

World Coarse Grains Use to Grow Modestly in 2021/22

The growth in coarse grain consumption is projected to be around 2 percent—owing mainly to higher corn, sorghum, and barley in China, increased corn feed and residual use in Brazil, and higher corn consumption (both feed and ethanol use) in the United States.

Following a strong recovery from the pandemic in the current year (**2020/21**), foreign feed and residual use expanded by about 4.5 percent. However, in the next year of **2021/22**, the relative price environment is expected to be rather different. High corn and sorghum prices are projected to continue into **2021/22**, encouraging the use of substitutes such as wheat, where available. Foreign feed and residual use of coarse grain is forecast to grow by 2.2 percent in 2021/22, lower than the average annual growth rate of just under 3 percent seen over the past two decades. Feed and residual use of coarse grain in foreign countries, minus China, is

projected to grow even slower, by a mere 1.6 percent in 2021/22, as other countries are expected to limit coarse grain feeding in response to the relative structure of grain prices where sorghum and corn are priced high relative to wheat.

China, the largest coarse grain feeder in the world, is expected to feed an additional 8.3 million tons of coarse grains (5.0 million tons more of corn, 2.1 million tons more of sorghum, 1.1 million tons of barley and less than 0.1 million tons of oats). The increased demand for feed is at least partially attributed to China's recovering swine herd, that was recently impacted by the African Swine Fever (ASF), which was followed by the steep culling of domestic inventory.

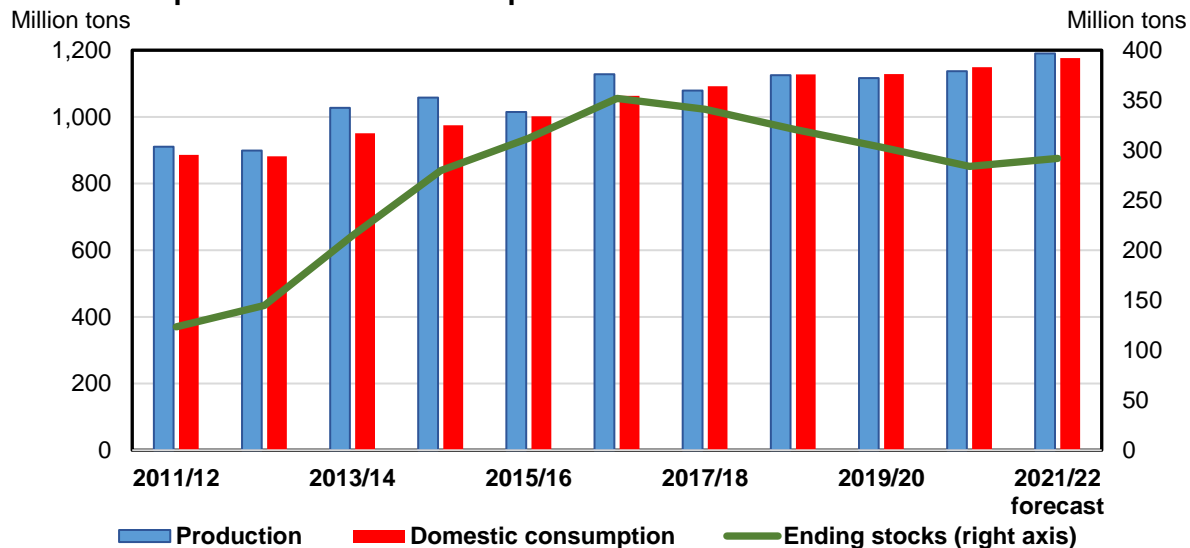
The effect of the ASF was multifold. There is some speculation that small traditional producers with weak sanitary practices suffered most of the losses and might not return to the market, while large producers operating modern facilities are rebuilding the hog herd. Contrary to the smaller traditional producers, the modernized hogs operations tend to forgo archaic types of feed, such as recycled food waste. The share of such feed (in total feeding in China) is estimated to be substantial and has to be replaced by standard feedstocks. For this reason, the side effect of the ASF, which has motivated the mass modernizing of hog production, is a sharply increased demand for corn and other feed grains (as well as for soybeans). This can (at least partly) explain the rapid increase in demand for grains in China in 2020/21 that is projected to continue into 2021/22—although it is not clear if the use of non-traditional feedstuffs (such as recycled food waste) will return with relatively high domestic corn prices.

Foreign food and industrial use (FSI) of coarse grains is forecast to grow by 4.6 million tons in 2021/22, or 1.2 percent, to 381.6 million tons. Demand for coarse grains for industrial use is expected to be generally sluggish because of unfavorable prices, relative to wheat. However, in a number of countries, higher FSI is supported by increased production prospects. Several countries in Sub-Saharan Africa (Malawi, Zambia, Tanzania, Nigeria, among several others) are expected to rebound their coarse grain use. Most of the Sub-Saharan increase is for direct human consumption, with feed use up only 0.6 million tons to 17.1 million.

Global Coarse Grain Stocks Slightly Up after 4-Year Decline

With coarse grain production forecast to be slightly higher than consumption for the first time in 5 years, projected world ending stocks for 2021/22 are up 6.6 million tons from a year earlier. With a 6.3-million-ton increase in U.S coarse grain stocks, foreign stocks for 2021/22 are projected up just fractionally. The previous 2020/21 year saw a steep decline in ending stocks, mostly in the United States and China.

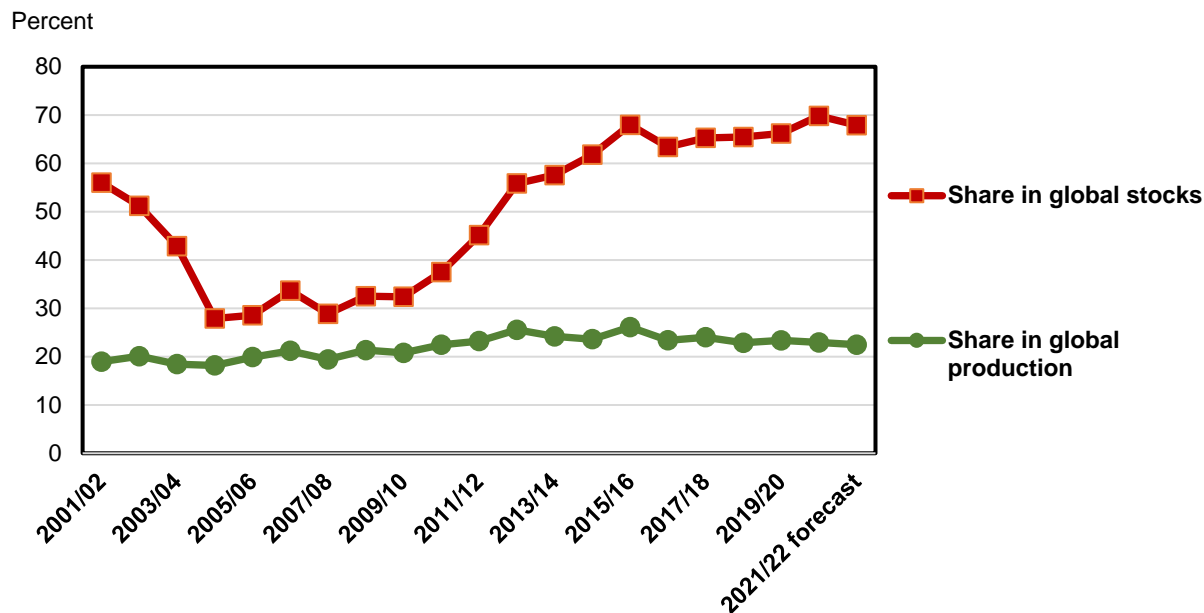
Figure 17
World corn production and consumption



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

Although China's share in global corn stocks is projected to fall slightly in 2021/22, its share in world stocks is much higher (more than triple) than its share in global corn output and has been at this level since 2015/16.

Figure 18
China: share in global corn stocks is three times the share in corn output

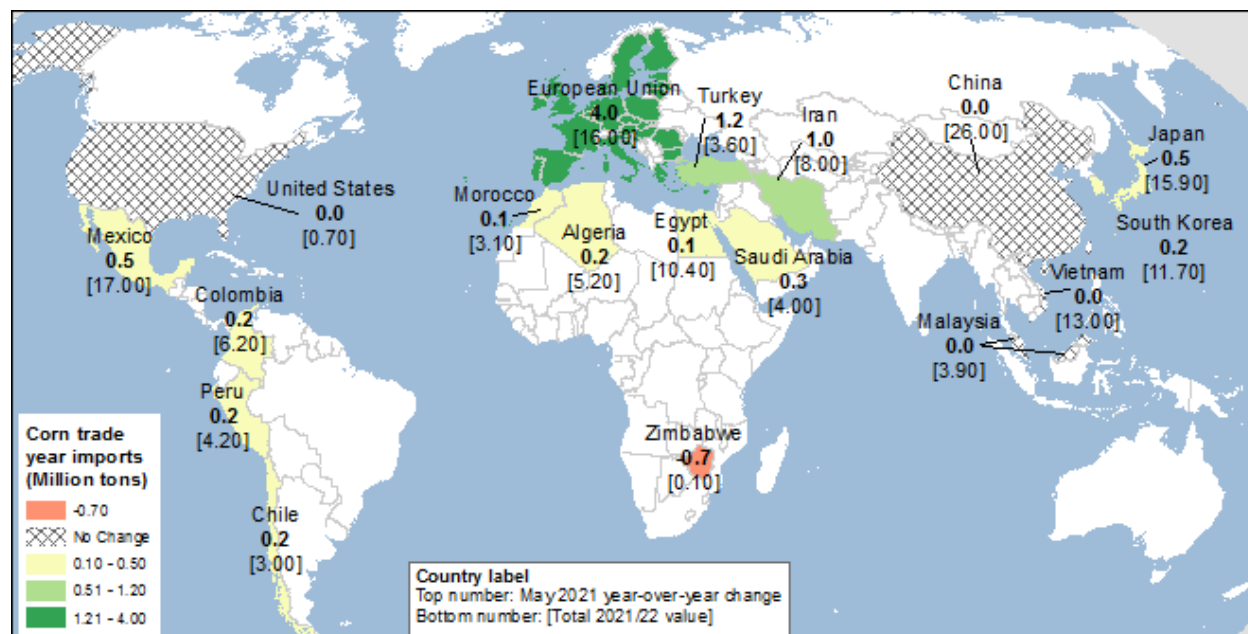


Source: USDA, Foreign Agricultural Service, *Production, Supply, and Distribution* database.

U.S. 2021/22 Corn Export Prospects to Face Tough Competition

Global corn trade in October-September **2021/22** international trade year (TY) is projected to reach a new record of 196.2 million tons, up 12.4 million from the corn trade forecast for 2020/21. The main driver of higher corn imports in most corn-importing countries is expanding meat production in line with income and population growth, though for some importers, high relative prices for corn are expected to dampen corn imports and feed use. The largest among the corn import projections increases include the **European Union**, up 4.0 million tons to 16.0 million, with corn coming mainly from **Ukraine**, and to a lesser extent, Brazil. Note that EU corn imports for 2020/21 are revised down 3.5 million tons this month. Projected currently at 12.0 million tons, the European Union imported less corn in 2020/21 than expected, mainly because limited Ukrainian supplies were largely re-directed to China (while only partly replaced by Serbia, Canada, and Brazil). Two other sizeable increases for corn imports in 2021/22 are for **Turkey** and **Iran**. For both countries, the increase stems from reductions in projected output. Map B below provides a quick look at the size and the year-over-year changes in global corn imports.

Map B – Major changes in corn imports for 2021/22



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

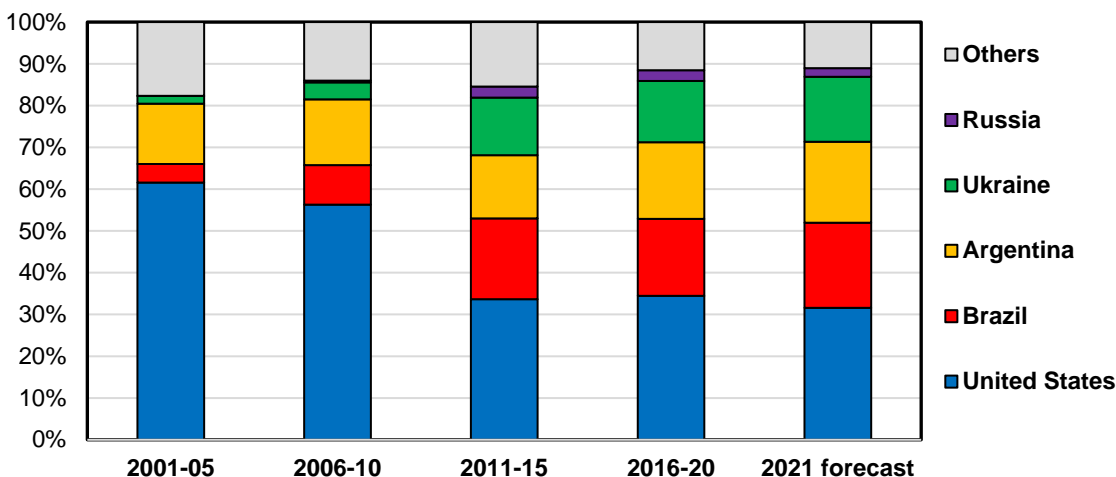
Larger corn supplies projected for the exporting countries in 2021/22 are expected to create strong competition, with a shift in global corn production and exports in favor of **Brazil**,

Argentina, and **Ukraine**. In 2021/22, the combined corn production of these 3 major corn exporters is expected to be 21.0 tons higher than a year ago. These largely export-oriented countries are to export collectively 108.5 million tons of corn, 75 percent more than projected U.S. exports, with the U.S. exports trending lower.

Figure 19

Growing corn demand captured by U.S. competitors

5-year averages and a forecast for 2021



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

In the current **2020/21** year, global coarse grain trade was driven largely by strong demand from **China** to meet its domestic feed needs, with imports of coarse grain at 43.3 million tons, 2.5 times more than in **2019/20** ([see the discussion above](#)). In the current year, China has become by far the largest world grain importer—a driver in the global grain trade—with sizeable import market share for corn, sorghum, barley, and oats. For **2021/22**, China is projected to import even larger volumes of coarse grain, up 3.0 million tons to 46.3 million. Growing Chinese corn demand and imports increase the country’s import market share and enhance its world price-making (rather than price-taking) market power. Rising Chinese corn demand and imports boost world corn prices.

China’s surge to the largest corn importer in the world is setting the stage for world grain trade in the **2021/22** projection year. China’s robust demand for feed is projected to continue into 2021/22 and global corn prices are projected to stay strong, partly because of high Chinese import demand. Even as the country imports massive amounts of corn into its Southern feed-deficit provinces and into the North China Plain, domestic corn prices in China continue to maintain a sizeable margin above import prices. However, the recent spread between domestic and world prices in China became somewhat smaller when a supply shock—lower projected second-crop corn output in Brazil—fueled global corn prices at a time when Chinese domestic

prices decreased a bit because of stocking up ahead of the country's May Labor day holiday. The current reduction in the price margin is not expected to last, and therefore, not limit China's grain imports in 2021/22.

For a discussion about the shortfall between corn use and supply in China, and the wide margin between China's domestic and international prices that are likely to sustain a high level of Chinese imports, see the [special article below](#).

China is importing large volumes of corn without making any formal announcement about any additions to its current tariff-rate quota of 7.2 million tons, which has a prohibitive above-rate tariff. While imports of corn substitutes (such as barley and sorghum) have been large in recent years as they are not subject to tariff rate quotas, the critical change in 2020/21—which is forecast to continue in 2021/22—was the apparent policy (and possibly economic decision) to import quantities of corn well above quota levels. While China is the second largest producer of corn in the world by a wide margin, the country is now expected to be the largest corn importer as well.

China is obtaining corn mainly from the United States and Ukraine—with much smaller amounts coming from Russia, Laos, and Burma. In prior years, Ukraine had established itself as a dominant supplier of corn to China. However, in 202/21, Ukrainian corn output was substantially reduced because of drought. China imports very little corn from Brazil due to the WTO (World Trade Organization) Sanitary and Phytosanitary Standards (SPS) disagreements. The reduction provided additional opportunities for the U.S. expansion of corn exports to China. In the next year (2021/22), with ample corn output in Ukraine, Chinese corn imports are projected to partly shift away from the United States towards more price-competitive Ukrainian corn—with Ukraine's total exports projected at 30.5 million tons, up 7.5 million tons from last year.

U.S. corn exports in 2021/22 (October-September TY) are projected to reach 62.0 million tons, down 8.0 million from the revised current 2020/21 projection of 70.0 million tons, still among the highest corn exports on record. On one hand, competition from **Argentina, Ukraine, and Russia**—whose combined exports are to increase by 19.5 million tons in 2021/22—is expected to weigh down on U.S exports. On the other hand, U.S. corn export prospects for 2021/22 are expected to continue to benefit from the massive Chinese imports. U.S. corn exports are also starting to get support from the current poor conditions in Brazil, as dryness in major producing areas cuts Brazil's 2020/21 second-crop corn yields.

Brazil had become a major supplier of corn to the world market prior to the U.S. corn harvest, and a decline in Brazil's second-crop corn size is pushing corn prices further into record area.

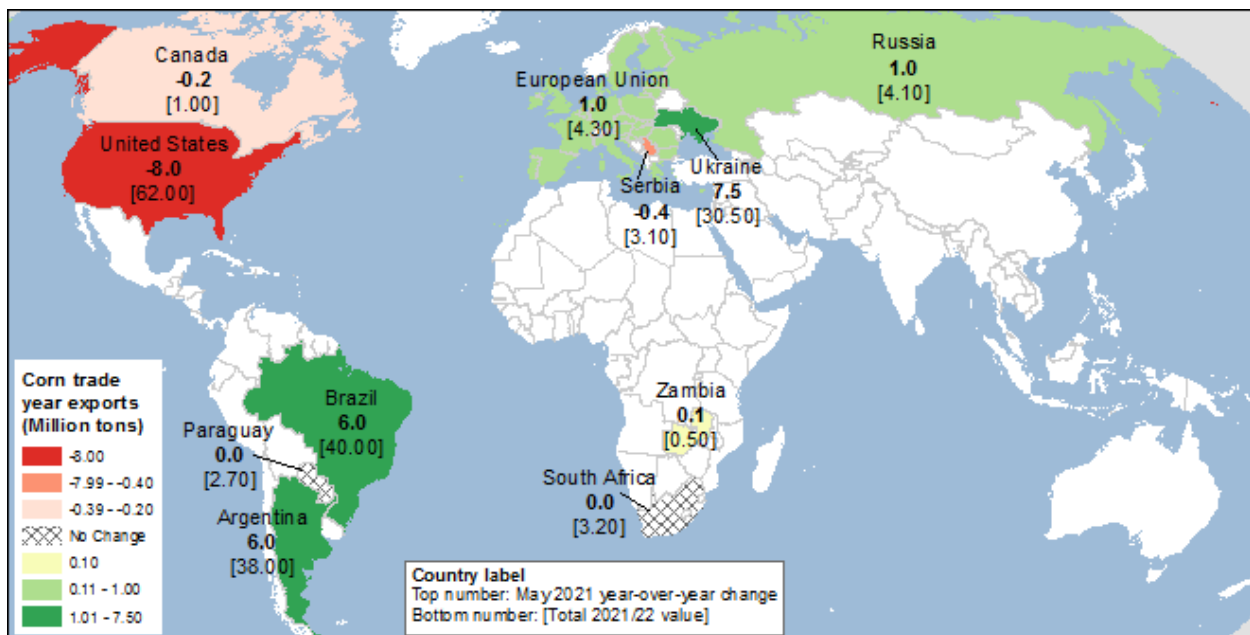
Export of the 2020/21 Brazilian crop are going to begin to increase seasonally during the July-August 2021 period and continue through March 2022, and is expected to affect export markets for the coming 2021/22 year. As Brazilian corn exports for the 2020/21 international trade year are downgraded, U.S. corn exports for the current October-September trade year of **2020/21** are projected 3.0 million tons higher to 70 million.

Argentina, with a large crop in 2021/22, on par to match the records of 2018 and 2019, is projected to increase exports by 6.0 million tons to a second place record high of 38.0 million, supported by high supplies and a depreciation of its currency (the peso).

In addition to South America and Ukraine, **Russia** and the **European Union** are also forecast to increase corn exports. An uptick in corn supplies in Russia support a 1.0-million-ton increase in exports to 4.1 million. Higher projected corn output in the European Union (in the southeast of Europe, but also in France) is expected to support a rebound in corn exports, up 2.1 million tons to 4.3 million.

Map C below provides a quick look at the size and year-over-year changes in corn exports for the major exporters.

Map C – Major changes in corn exports for 2021/22



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

Special Article: Corn-led Surging Commodity Prices in China During 2020

Fred Gale, Senior Economist

Soaring Prices in China Drive Corn Import Surge

China's customs data show that its corn imports surged to a record 11.3 million metric tons (mmt) in calendar year (CY) 2020, more than twice the volume imported in past years. The data showed that an additional 6.7 mmt was imported in the first 3 months of 2021.

The import boom appears to be driven by a combination of market conditions and policy factors. Rapid growth in Chinese corn prices indicated tight corn supplies in the country, and Chinese officials may have purchased more corn to meet China's commitments to purchase U.S. agricultural products in the Phase One trade agreement with the United States. Robust imports in CY2021 bolster expectations that China's large corn imports will be sustained in the future.

China's Imports of Corn and Substitutes Surged in 2020

The explosive growth in China's corn import surge is less prominent when viewed alongside fluctuations in imports of commodities that can be substituted for corn. Substitute commodities include sorghum, barley, distillers' grains, cassava, and field peas. In CY2020, China imported 19.5 mmt of these substitute commodities, plus 11.3 mmt of corn, for a total of 30.8 mmt (figure SA1).¹ While the combined 2020 total was up sharply from the 17 mmt imported in 2019, it was not extraordinarily high compared with some other recent years. China imported about 27 mmt of corn and substitutes in 2014, 2016 and 2017. Imports peaked at nearly 43 mmt in 2015, when a floor price for Chinese corn prompted feed manufacturers to import cheaper raw materials from overseas (the floor price policy was abandoned in 2016).

Domestic Chinese corn is the predominant ingredient in the production of China's animal feed and is widely used in starch, food, chemical and alcohol products. However, as Chinese corn prices drifted above international prices in recent years, many Chinese feed mills and processors supplemented domestic corn with imported substitutes to avoid a cumbersome tariff rate quota (TRQ) system for corn imports. The TRQ system requires prospective corn importers to apply for a share of an annual 7.2 million metric ton (mmt) quota each year, while substitute

¹ Additionally, industry sources indicate that a substantial amount of China's wheat imports during 2020 were used for feed, but most imported wheat was likely used for flour manufacturing.

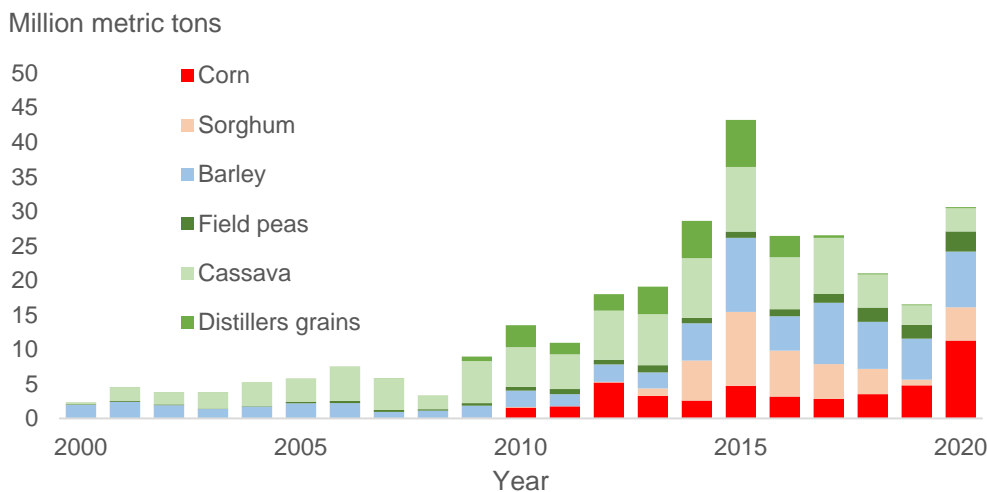
commodities have relatively low tariffs and no quota restrictions. Unlike corn—sorghum, barley, cassava, and field peas are not genetically modified—which excludes them from China’s lengthy process for approving GM varieties for import.

Corn imports exceeded the corn TRQ for the first time in 2020, and large purchases by Chinese state-owned companies appear to have driven the increase. Chinese customs data reveal that Beijing-headquartered companies accounted for 6.7 mmt of the 11.3 mmt of 2020 corn imports, a 59-percent share of the total (figure SA2). Beijing companies’ share of corn imports far exceeded their 10-percent share of imported corn substitutes.

The high Beijing share of corn imports suggests that state-owned companies carried out a policy decision to import more corn. Few major agribusiness companies, besides state-owned entities, are based in Beijing. The Beijing companies’ 59-percent share of corn imports in 2020 is close to the 60-percent share of China’s corn TRQ that is earmarked for import by China’s Beijing-based state-trading entity, in regulations that guide administration of grain TRQs. The small share of corn imported by private companies that are registered in provinces like Shandong and Guangdong—the locations of leading producers of feed and starch products—suggests that imports by these companies rose at a much slower pace than imports by Beijing companies during 2020.

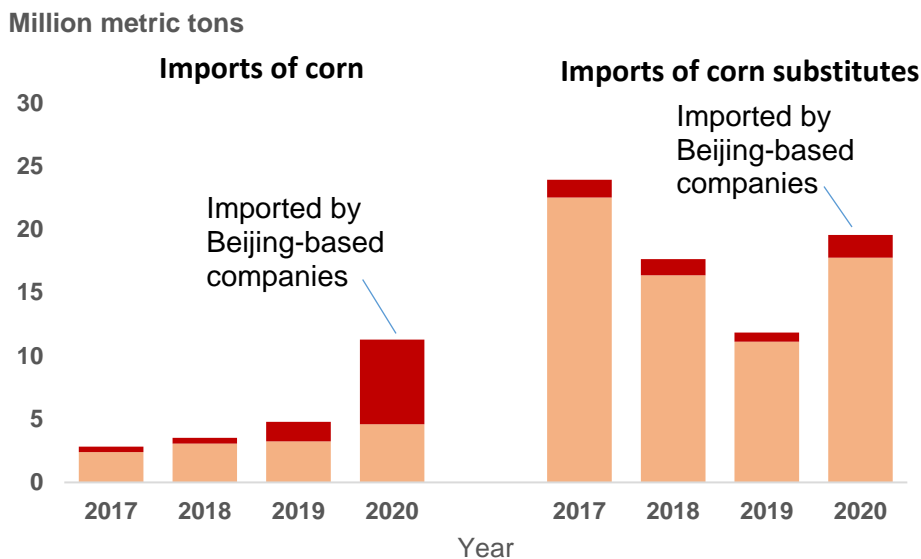
The year-to-year pattern of imports also differs between corn and substitutes. Figure SA-2 shows that China’s corn imports displayed a rising trend, and Beijing-based companies accounted for nearly all the increase in corn imports during 2020. In contrast, China’s imports of corn substitutes dropped in 2018 and 2019, before rebounding in 2020, to a level slightly above the 2018 value.

Figure SA1
China's imports of corn and substitute commodities, 2000-20



Note: Calendar years. Harmonized system codes 1005 (corn), 2007 (sorghum), 1003 (barley), 071310 (field peas), 071410 (cassava), and 230330 (distillers' grains).
 Source: USDA, Economic Research Service analysis of China's customs data, accessed by Trade Data Monitor.

Figure SA2
China's imports of corn and substitutes, by headquarters of importer, 2017-20



Note: Data show the location of importing companies' registration, not the geographic destination of imports. China no longer publishes tabulations of customs data by port of entry. Corn substitutes include sorghum, barley, field peas, cassava, and distillers' grains.
 Source: USDA, Economic Research Service analysis of China's customs data accessed by Trade Data Monitor.

The Beijing-based surge in corn imports is consistent with reports of a government plan to boost corn imports. In April 2020, a news outlet (controlled by China's grain reserve corporation)

reported that officials discussed a plan to import 20 mmt of corn, 10 mmt of soybeans—and unspecified quantities of cotton, sugar, and soybean oil to restock government reserves (China Grain Net, 2020). According to the report, the plan was motivated by: concerns about threats to China’s food security during the global pandemic, the favorable buying opportunity presented by low global prices at the time, and China’s commitments to buy U.S. agricultural products in the Phase One trade agreement with the United States. While the meeting was described as a “rumor,” it was also reported by other news outlets. State-controlled *Futures Daily* (2020) noted that Chinese futures prices rose to varying degrees after the discussion was publicized. The news reports are consistent with the surge in imports that occurred in subsequent months.

The volume of corn imports in the second half of CY2020 was much larger than expected. Market analysis organizations in China—both Chinese Government-affiliated and private—had projected about 7 mmt of corn imports for market year 2020/21, until large purchases began in mid-2020. A year later, the same organizations estimated that 2020/21 imports would reach 22 to 28 mmt. Some other analysts thought even larger imports are possible.

Fluctuations in imports of corn substitutes are also affected by policies. Chinese authorities imposed antidumping and countervailing duties (AD/CVD) on U.S. distillers dried grains with solubles (DDGS) in 2016. AD/CVD tariffs of 179-percent were briefly imposed on U.S. sorghum in April 2018, but they were suspended the following month. In July 2018, China assessed retaliatory tariffs on U.S. sorghum and most other U.S. products, as China-U.S. trade tensions escalated. The rebound in sorghum imports during 2020 might have reflected waivers of retaliatory tariffs on U.S. products offered by Chinese authorities. In May 2020, China imposed AD/CVD duties on Australian barley.

Chinese Corn Prices Soared in 2020

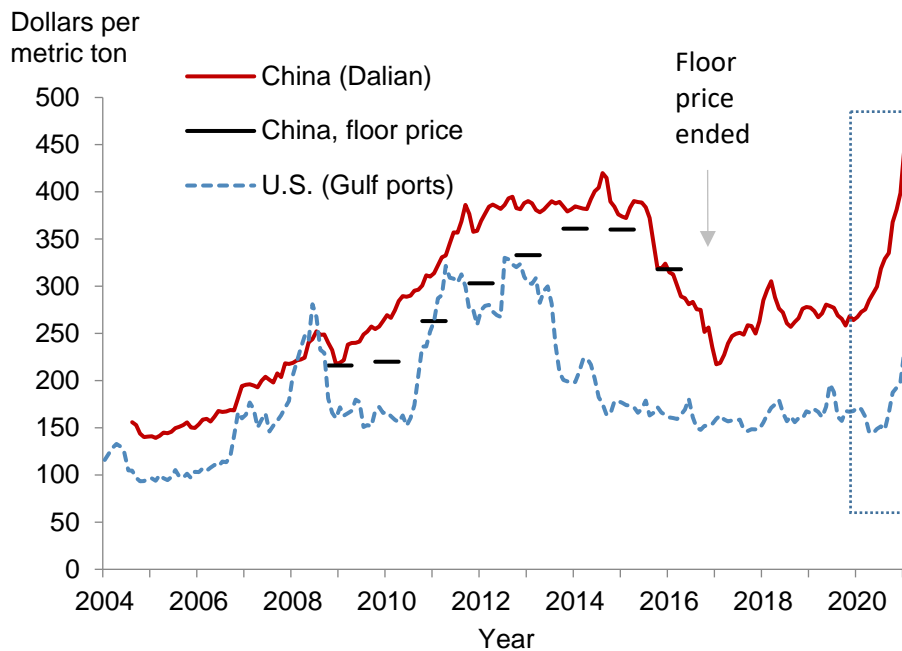
Rising corn prices in China during 2020 reflected a tightening market. The average corn price at Dalian (a port in northeastern China) rose from \$267 per metric tons to \$455 per metric tons between January 2020 and March 2021 (figure SA3). The March price exceeded the previous 2014 peak of \$420, and the growth in corn prices during 2020 was much faster than an earlier 9-year rise that began in 2005. The price in China exceeded the U.S. Gulf price by nearly \$200 per metric tons in early 2021, making imports highly profitable.

The rise in corn prices stood out as the fastest among major Chinese commodities during 2020. Agricultural producer price indexes, released by China’s National Bureau of Statistics for the first quarter of 2021, showed that corn prices had risen 41 percent from a year earlier (figure

SA4). Annual growth in other agricultural producer prices ranged from 14.9 percent for cattle to a 6-percent decline for hogs. The increase in corn prices also far exceeded the average 7.8-percent rise in prices of China’s industrial raw materials, reported over the same period.

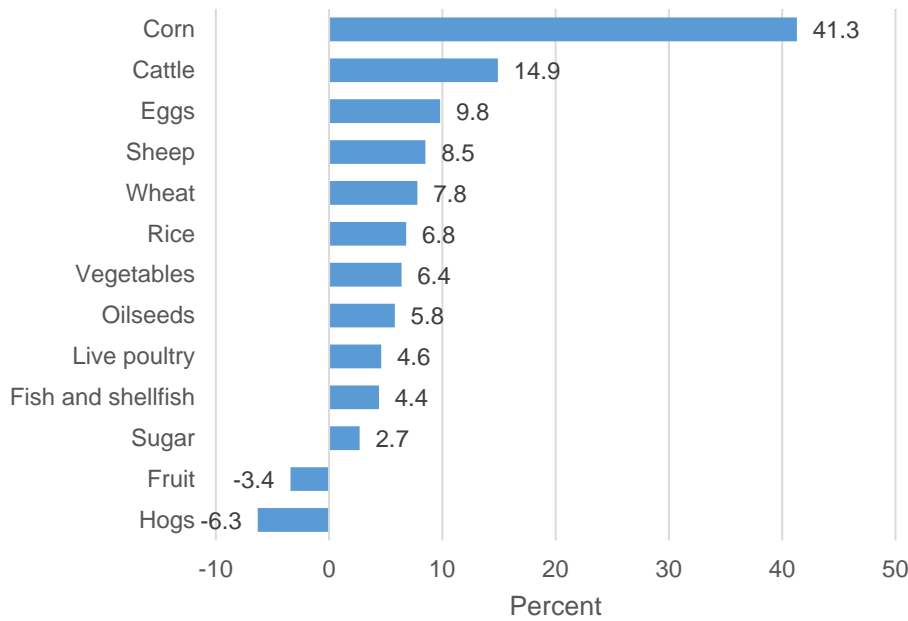
While the volume of corn imports was more than expected, participants in China’s corn market anticipated tight supplies early in the year. A January 2020 futures market commentary, for example, predicted rising corn prices due to diminished government corn reserves and continued limits on corn imports (Nongchanpin Qihuo Net, 2020). As prices rose during 2020, Chinese officials blamed speculation and hoarding for exacerbating corn price increases. Officials tightened requirements for participating in auctions of government corn reserves, launched investigations of hoarding by warehouse operators, and warned speculators that imports and auctions of wheat and rice reserves could undercut corn prices (Heilongjiang Soybean Association, 2020; *Beijing Business News*, 2020).

Figure SA3
Corn prices in China and the United States, 2004-21



Note: Monthly averages. Chinese prices converted to dollars at official exchange rate.
 Sources: China National Grain and Oils Information Center; China National Development and Reform Commission; USDA.

Figure SA4
**Chinese agricultural producer price indexes,
 Q1 2021 annual change, by commodity**



Source: China National Bureau of Statistics.

China’s Corn Use Outpaces Production

China’s demand for corn seems to have outpaced its production in recent years. One recent analysis declared a “consensus” that China’s annual corn production falls short of its domestic use (Sina Finance, 2021).

Two market analysis organizations affiliated with Chinese government departments—China’s Ministry of Agriculture and Rural Affairs (MARA) and the China National Grain and Oils Information Center (CNGOIC)—both estimate that China produced 261 mmt of corn in 2020 and will use more than 280 mmt of corn during MY 2020/21.² The actual volume of China’s reserves is unknown, but officials reported that corn reserves have shrunk substantially, after auctioning a reported total of more than 200 mmt of reserves during 2017-20. With fewer reserves to inject into the market, the deficit between production and use suggests that China can only fill its deficit by importing corn.

² These organizations do not report the level of grain stocks. They report a net surplus/deficit, which is the difference between all sources of supply and uses of corn.

Growth in animal feed production—the chief use of corn in China—has been instrumental in driving China’s demand for imported commodities (Gale, 2015). Production of commercial animal feed rose 53 mmt between 2015 and 2020, while output of meat and eggs declined during those years (figure SA5). China’s transition from backyard livestock farming to industrialized farms (and substitution of commercial feed for restaurant waste and low-grade fodder) may have contributed to the rise in commercial feed output. News media reports indicate that the recovery of China’s swine herd from its African swine fever epidemic may accelerate these trends by replacing “backyard” farms with large-scale swine farms. Authorities prioritized the elimination of farms using restaurant waste to feed swine because the practice was believed to promote spread of ASF.

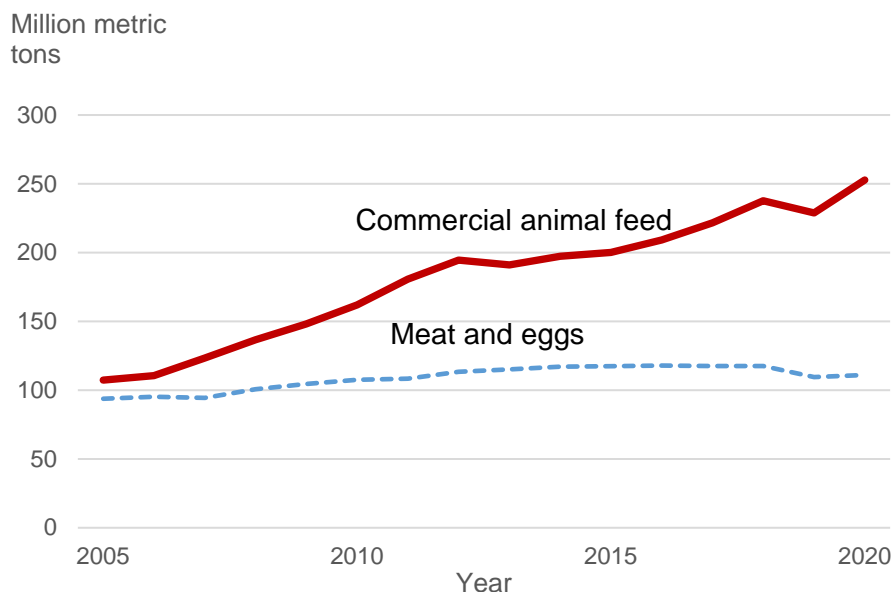
In April 2021 Chinese agricultural officials issued recommendations urging livestock producers to replace corn and soybean meal with other feedstuffs to indigenize feed ingredients (National Animal Nutrition Guidance Committee, 2021).³ The document recommended replacing corn mainly with substitutes that are also imported—sorghum, barley, cassava—and with wheat and rice that are grown for human consumption and are normally too expensive for use in animal feed. Officials reportedly auctioned millions of tons of wheat and rice reserves to replace corn in animal feed during 2020 and 2021, but wheat and rice substitution is viable only because corn prices rose so rapidly during 2020.

China’s progress in restoring swine production is an uncertain influence on feed use. China’s Ministry of Agriculture and Rural Affairs (2021) predicted that swine inventories would return to “normal” levels by June-July 2021. However, reports of speedy recovery are inconsistent with persistently high feeder pig prices, record meat imports in the first quarter of 2021, and reports of disrupted breeding systems and resurgence of disease.

China’s industrial use of corn for manufacturing starch, sweeteners, and alcohol products became significant during the early 2000s when the country had a surplus of corn (Gale, et al., 2009). Growth in industrial use slowed and Chinese officials phased out subsidies for corn processing industries, as corn prices rose in later years. A 2017 plan for an E10 ethanol fuel mandate stalled as corn prices rose, and production of starch and sweetener products also slowed during 2019-20. Tight corn supplies in the future, and the government’s push for greater adoption of hybrid and electric vehicles, could restrain growth in China’s industrial use of corn.

³ Guidance for reducing corn and soybean meal use was one of many recommendations included in a document calling for improved quality in China’s livestock industry, issued by China’s State Council in September 2020.

Figure SA5
China's feed and meat output, 2005-2020



Source: USDA, Economic Research Service analysis of data from China Feed Industry Association; China National Bureau of Statistics.

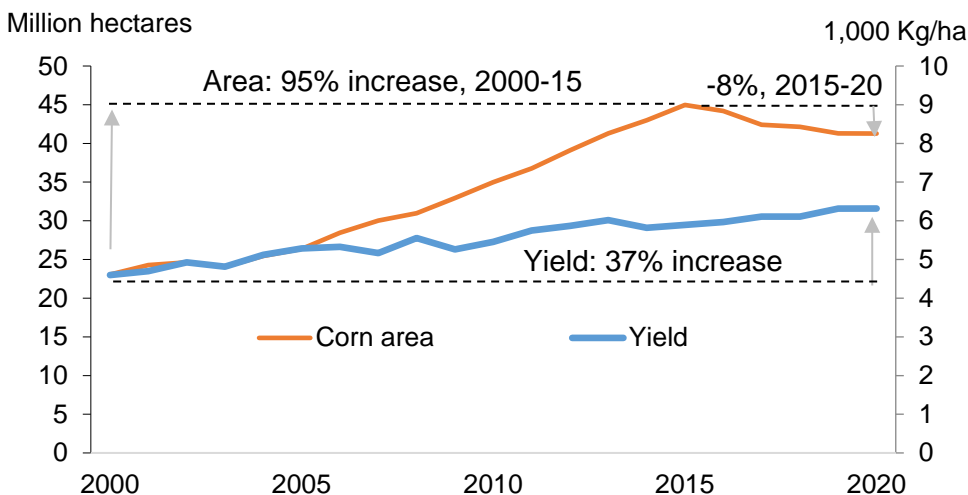
China's past growth in corn output was achieved mainly by expanding area planted in corn (figure SA6). In 2016, a decline in corn prices followed the removal of the price floor, discouraging corn production. That same year, environmental concerns and surplus production prompted officials to launch a "supply side structural adjustment" initiative to cut corn area over 5 years. Corn area declined 8 percent during 2015-20. Rising corn prices could reverse the decline. China's Ministry of Agriculture and Rural Affairs (2021) projected a 4.4-percent increase in corn production in 2021. Continued concerns about soil erosion, and loss of cropland to real estate development and rural development projects, could limit the expansion of corn area. The Ministry projected a 27-percent increase in corn production during 2020-33, attributed mostly to rising yield per hectare.

China's average corn yield has trended upward since the 1960s (Gale, Jewison, and Hansen, 2014). The cumulative increase in China's corn yield was 31 percent during 2000-20.⁴ Further rises in corn yields could be aided by improvements in seed industry R&D, included as one of the top priorities for economic development policy in 2021 by China's communist party

⁴ The yield data in figure SA-6 has a trend of 84 kilograms per hectare per year (kg/ha/year), similar to the trends of 74 to 96 kg/ha/year, estimated by Gale, Jewison and Hansen (2013) for China's corn yields for 1980-2013.

leadership. Yield gains will likely continue to rise at a moderate pace of 1 to 2 percent annually, as improvements in pest and weed control are offset by new pest problems and weather events.

Figure SA6
China's corn area and yield, 2000-20



Note: Data incorporates revisions made by National Bureau of Statistics, following 2006 and 2016 agricultural censuses. Kg/ha = kilograms per hectare.
 Source: USDA, Economic Research Service analysis of China National Bureau of Statistics.

Summary

Market analysts agree that China's utilization of corn has outpaced its production, consistent with the strong rise in Chinese corn prices during 2020. In future years, the shortfall between corn use and production in China (and the wide margin between Chinese and international corn prices) are likely to sustain China's corn imports at a higher level than in years prior to 2020.

However, the lack of precise data on corn use in China, and the substitution of other grains and feeds in response to changes in corn prices, complicates the estimation of corn import demand. Fluctuation in the volume of imports is difficult to predict. Opaque decisions by Chinese state-owned companies appear to have driven the unexpected surge in MY2020/21 imports. Unobservable factors, such as a policy changes or completion of an inventory replenishment program carried out by state-owned companies, could also cause imports to fall unexpectedly.

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