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Feed Outlook: August 2023

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In this report:

Lower U.S. Feed Grain Production on Reduced Crop Yields

U.S. feed grain production in 2023 is forecast at 398 million tons, down 5.7 million tons this month, reflecting lower yields in corn and sorghum. U.S. corn production is lowered 209 million bushels on a 2.4 bushel per acre yield drop to 175.1 bushels. Corn supply now totals 16.59 billion bushels, with the lower production partially offset by increased beginning stocks. Corn usage is cut by 95 million bushels for 2023/24 on lower feed and residual, exports and food, seed, and industrial usage forecasts. Corn ending stocks for 2023/24 are lowered 59 million bushels to 2.2 billion. Corn usage in the 2022/23 marketing year is trimmed by 45 million bushels on changes to food, seed, and industrial and export usage.

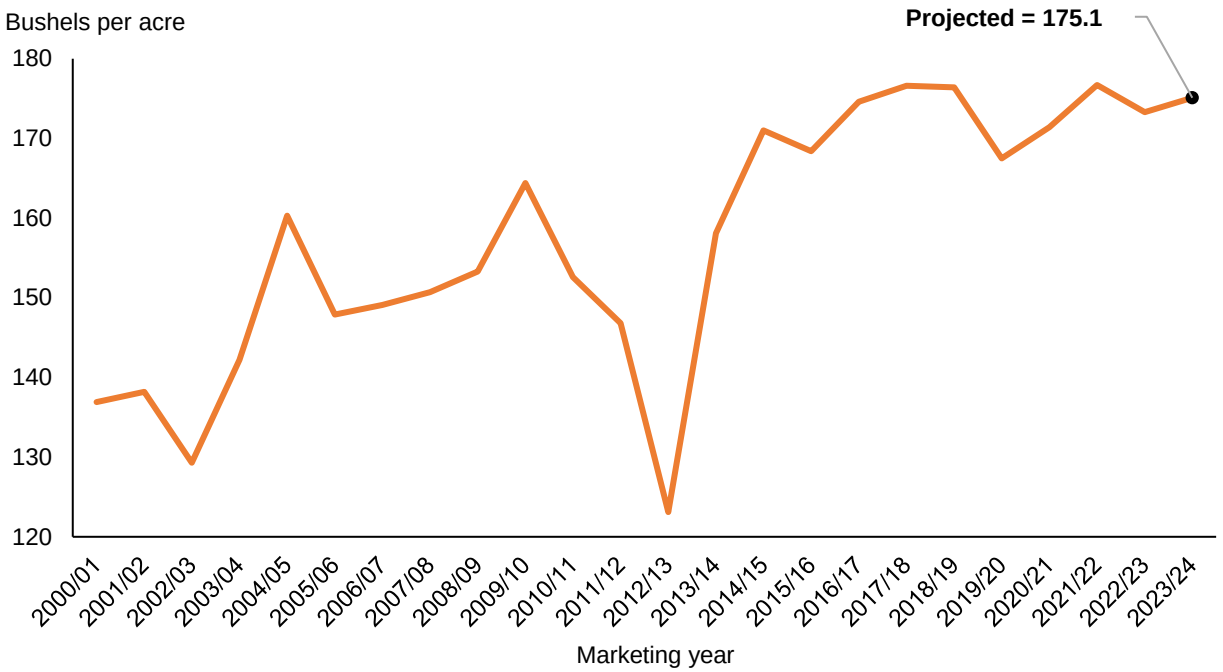
Global coarse grain production in 2023/24 is projected down 16.1 million tons this month at 1,497.3 million tons. Foreign coarse grain production (global minus U.S. output) for 2023/24 is projected 10.4 million tons lower—driven primarily by reduced corn and barley output—but sorghum, oats, and rye are also lower. Corn production in the ***United States*** (which is down 5.3 million tons) is a major contributor to the decline, although declines in corn (down 3.7 million) and barley (down 2.0 million) production for the ***European Union*** also contribute to the lowering of global production. Global coarse grain trade and global domestic use are each down for 2023/24, reflecting the projected lower production.

Domestic Outlook

U.S. Corn Supply Is Lower for 2023/24 on a Production Drop

The USDA, National Agricultural Statistics Service (NASS) projects U.S. corn production in 2023/24 to be 15.11 billion bushels, down 209 million bushels from the previous forecast, on a lower yield. Planted and harvested acreage remain unchanged from last month. U.S corn yield for 2023/24 is projected at 175.1 bushels per acre, based on the NASS initial survey-based yield forecast in August, down 2.4 bushels from last month's projection (see figure 1). Large year-over-year yield declines reflect the adverse weather conditions experienced thus far in the crop year. Year-to-year corn yield declines are particularly pronounced from last year in Illinois (13 bushels lower), Minnesota (12 bushels lower), Wisconsin (14 bushels lower), and Missouri (18 bushels lower).

Figure 1
U.S. corn yield, by marketing year

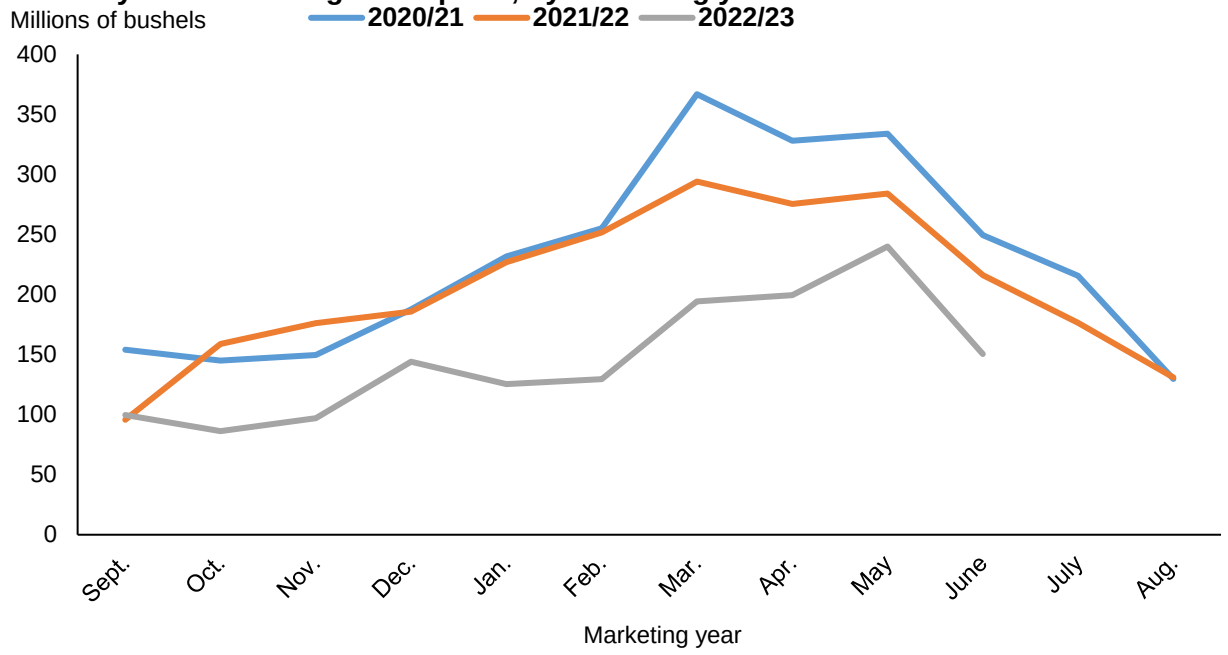


Source: USDA, National Agricultural Statistics Service.

Total corn supplies for 2023/24 are projected down 154 million bushels to 16.59 billion bushels, on lower production, but are partially offset by higher beginning stocks due to reductions in 2022/23 corn use. Corn exports are reduced 25 million bushels this month to 1.625 billion. The weak pace of exports continues into the last quarter of the marketing year, with June exports totaling 150.4 million bushels, down approximately 66 million bushels from June 2022. Corn

exports through the first 10 months of the marketing year sit at 1.466 billion bushels (see figure 2). A sluggish pace to corn export inspections through July and early August point toward weaker corn exports to close out the marketing year. Lower estimated domestic use for glucose/dextrose (down 10 million bushels to 355 million) and starch (down 10 million to 230 million) in the third quarter of the marketing year brings total use for 2022/23 to 13.685 billion bushels. An increase (due to pace) in corn imports to 35 million bushels exacerbates the reduction in use, leaving U.S. ending stocks 55 million bushels higher for the current marketing year at 1.457 billion bushels.

Figure 2
Monthly U.S. corn for grain exports, by marketing year



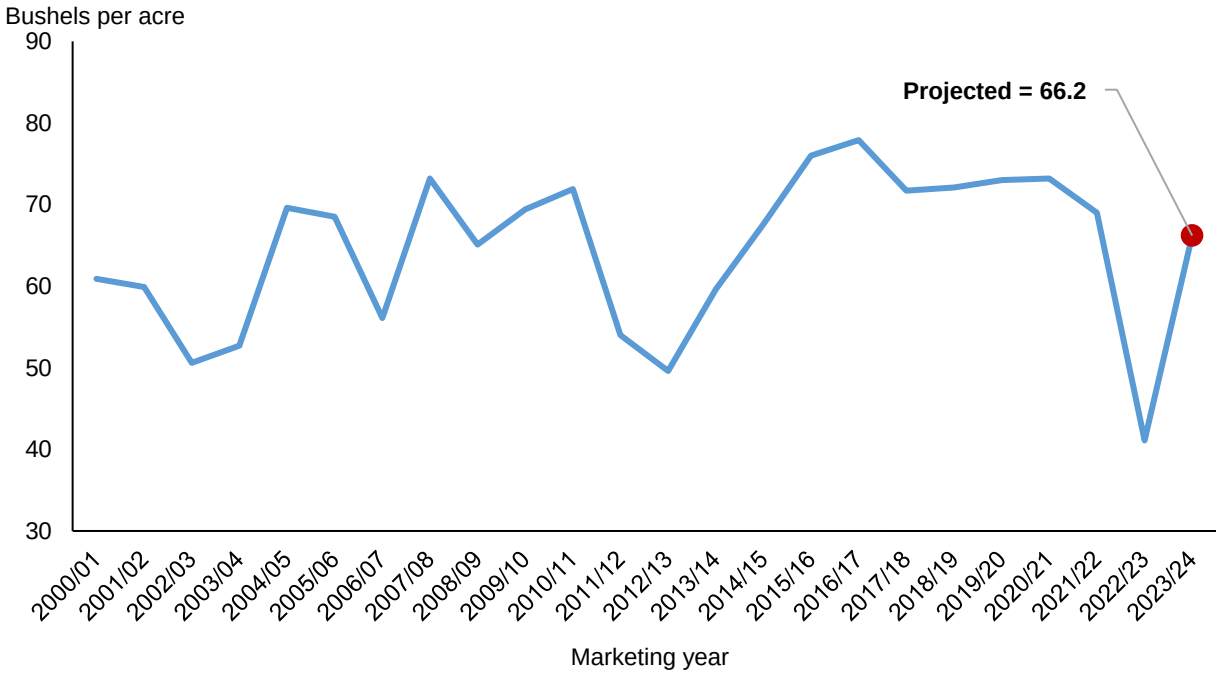
Source: U.S. Department of Commerce, Bureau of the Census.

Total corn use for 2023/24 is projected at 14.39 billion bushels, down 95 million bushels from the July report. Corn feed, seed, and industrial use is lowered 20 million bushels to 6.715 billion bushels, due to a decrease in starch and dextrose/glucose on weak usage carried through from 2022/23. Corn feed and residual is forecast down 25 million bushels at 5.625 billion on diminished supply. Exports are reduced 50 million bushels on the tighter availability to 2.05 billion. Corn use for ethanol remains unchanged, resulting in ending stocks falling 59 million bushels to 2.2 billion bushels. The seasonal average farm price forecast increased $0.10 to $4.90 per bushel.

Sorghum Production Is Projected Down Due to Lower Yields

Sorghum production for 2023/24 is projected down 18 million bushels, due to a reduction in yields. Dry conditions (in Texas, Oklahoma, and the western parts of Kansas and Nebraska) resulted in the downward revision of sorghum yields to 66.2 bushels per acre, 3 bushels per acre lower than reported in July's projection that was based on the historical median yield (see figure 3). Planted and harvested area for 2023/24 remains unchanged. New crop feed and residual use is lowered 15 million bushels to 75 million, due to reduced production. Sorghum exports and feed, seed and industrial usage is unchanged from last month. U.S. sorghum ending stocks for the 2023/24 marketing year total 33 million bushels, down 3 million bushels from July.

Figure 3
U.S. sorghum yield, by marketing year

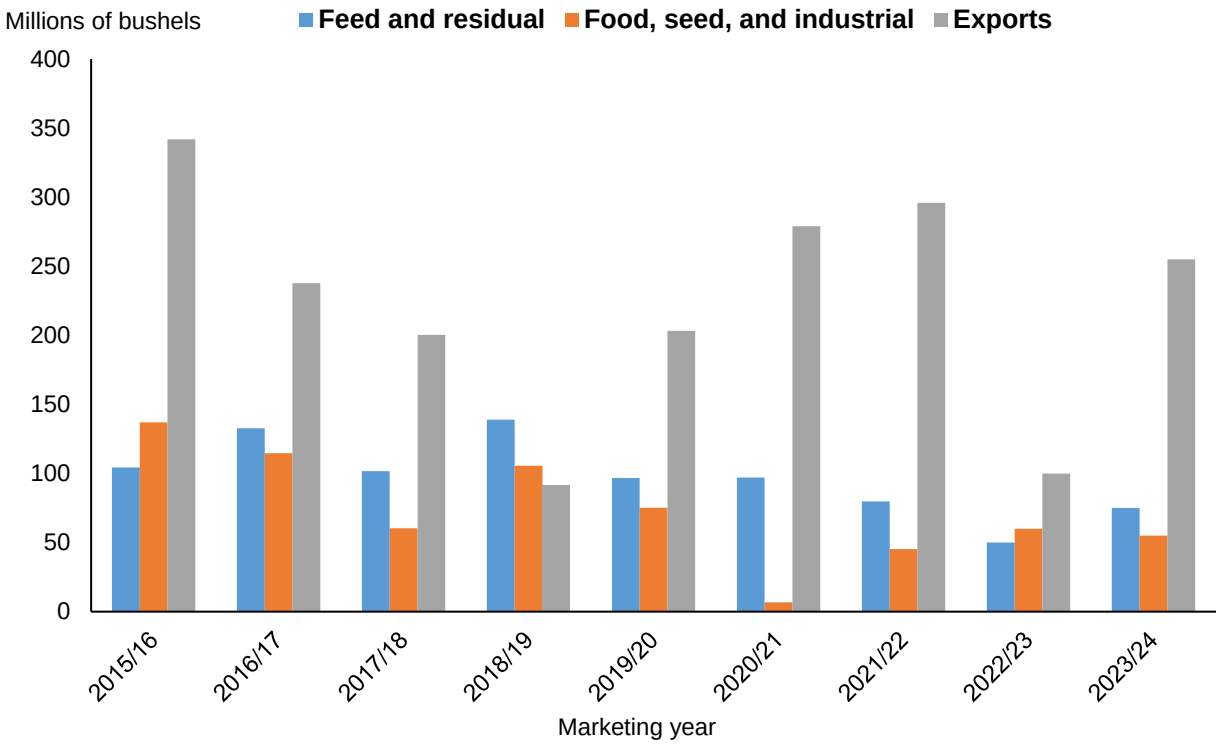


Source: USDA, National Agricultural Statistics Service.

Total use for sorghum in 2022/23 remains at 210 million bushels, but use categories for sorghum changed on demand strength in ethanol and export markets in the later part of the marketing year. Sorghum use for ethanol production totals 45 million bushels through the first three quarters of the marketing year. An expectation of expanded ethanol crush for sorghum (carrying into the fourth quarter of the marketing year) leads the ethanol use category to be raised to 58 million bushels. Total feed, seed, and industrial comes in at 60 million bushels. The export pace for the 2022/23 crop picked up in the second half of the marketing year, sorghum

exports are increased 10 million bushels to 100 million. Sorghum exports through June total 78 million bushels. Exports and export sales picked up in July. With outstanding sales for the marketing year through August 3 equaling 31 million bushels, exports are expected to move higher in last 2 months of the marketing year. Feed and residual usage is lowered to 50 million bushels, in an offset to increases in other usage (see figure 4). U.S. sorghum ending stocks remained unchanged at 25 million bushels. The projected sorghum season average farm price is estimated at $6.75 per bushel in 2022/23, down 10 cents from last month and consistent with the downward trend observed in NASS's reported monthly price received. Prices received were reported at $5.82 per bushel for June; down $0.67 from May.

Figure 4
U.S. sorghum use, by marketing year



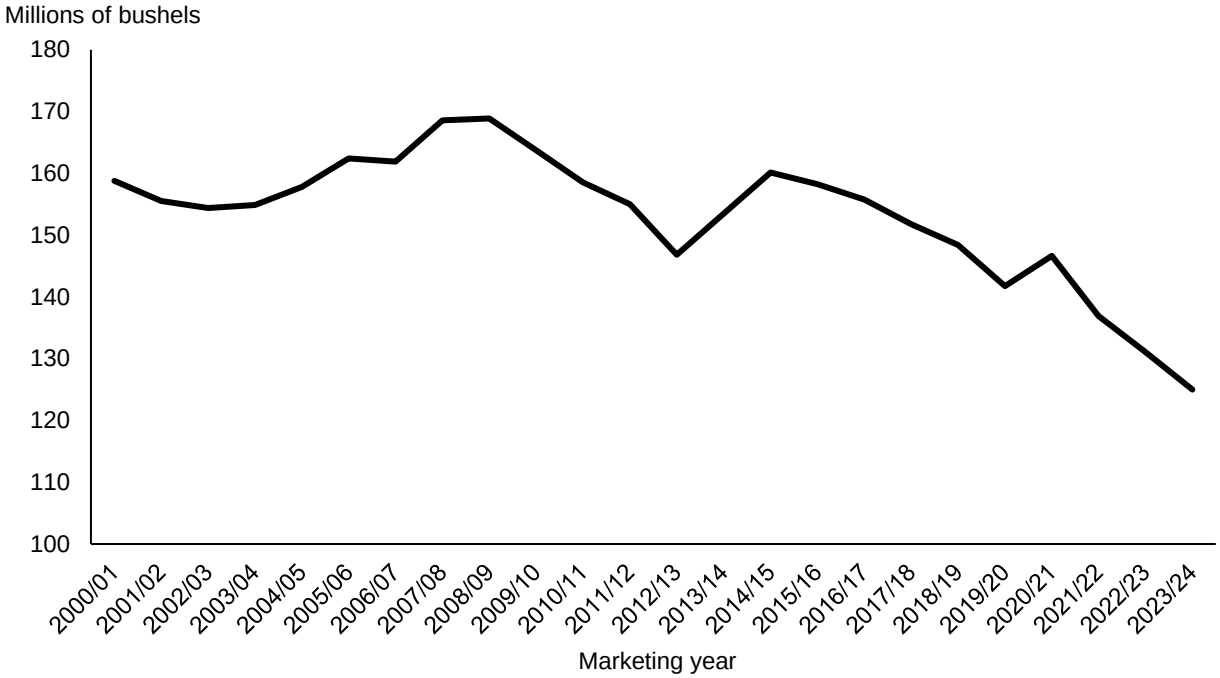
Source: USDA, *World Agricultural Supply and Demand Estimates*.
2023/24 is a projection.

Higher Barley Price for 2023/24, Production Is Up From Last Month

Barley production for 2023/24 is projected at 180 million bushels, a 3-million-bushel increase from the July *World Agricultural Supply and Demand Estimates (WASDE)* report. NASS's August *Crop Production* report stated national barley yield at 75.1 bushels per acre, up from

the 70.1 bushels per acre forecasted for the previous month. As barley supply (at 250 million bushels) is expected to increase for 2023/24, barley imports are projected down from last year at 14 million bushels. Barley use is forecast at 178 million bushels, unchanged from last month. Feed and residual is raised 10 million bushels, to 50 million, on larger supply. Lower beer production in the fourth quarter of last marketing year points toward a continuation of weaker barley use for beer production in 2023/24. Food, seed, and industrial use is dropped by 10 million bushels to total 125 million (see figure 5).

Figure 5
U.S. barley food, seed and industrial usage, by marketing year



Source: USDA, *World Agricultural Supply and Demand Estimates*.
2023/24 is a projection.

Barley ending stocks are projected at 72 million bushels, up 3 million bushels from last month but up 16 million bushels from last marketing year. The projected season average price is revised upward $0.65 per bushel to $6.75 for 2023/24, on stronger malting barley price. The barley price received by farmers (as reported by NASS) in June came in stronger than expected. Malting barley was priced at $7.84, while feed barley was $5.43. June, the first month of the marketing year, is typically a relatively light marketing month for barley. However, the previous marketing year's high barley prices carried into the early part of the marketing year and merited an increase in malting barley price expectations for 2023/24.

Minor Downward Change to Oat Supplies in 2023/24

Oats production in 2023/24 is projected at 49.5 million bushels, down 0.5 million bushels from July. NASS is forecasting this year's national crop to be 61.5 bushels per acre, on 0.8 million acres of harvested area. No changes are anticipated for domestic use or exports. As most of the U.S. oat supply is imported, imports for 2023/24 remain at 80 million bushels, despite some early indications of issues with the oat crop in Canada. The projected season-average farm price for oats is projected at $3.30 per bushel, unchanged from last month.

Grain Consuming Animal Units Are Projected Down for 2023/24, With Higher Total Feed and Residual for Grains Expected

Grain consuming animal units (GCAUs) are estimated at 99.8 million units for 2022/23 and projected to be slightly lower in 2023/24, at 99.0 million units. This estimate is the lowest since 2017/18 but is up from the 2023/24 estimate of 98.2 in July. The month-to-month increase is primarily due to a 1.0-million-unit increase for cattle on feed that is partly offset by a 0.1-million-unit decrease in the poultry sector. With the latest projections, GCAUs have fallen for 4 consecutive years. GCAUs peaked at 101.8 in 2019/20.

Total feed and residual for all grains (corn, sorghum, barley, oats, and wheat) is projected at 150.9 million metric tons for 2023/24, down from the previous month's projection of 151.7 million metric tons. The reduction is driven by a decrease in feed and residual use for corn, sorghum, and wheat that is partially offset by an increase in projected barley use. Oats feed and residual use is unchanged from July.

International Outlook

Lower Coarse Grain Production in the United States Amplifies Foreign Decline

Global coarse grain production in 2023/24 is projected to reach 1,497.3 million tons, down 16.1 million this month. Foreign coarse grain production (global minus U.S. output) for 2023/24 is projected 10.4 million tons lower—with reduced corn, sorghum, oats, barley, and rye output partly offset by higher millet production. For the ***United States***, downward revisions in corn and sorghum yields contributed to the global lower production. For more information related to ***U.S***. changes, see the Domestic section of this report.

The ***European Union*** leads the foreign coarse grain production decline for 2023/24—with a 6.9-million-ton reduction—followed by a reduction of 3 million tons from ***China*** and 2.9 million from ***Russia*** (along with smaller changes from ***Canada***, ***Bolivia,*** and ***Vietnam)***. Partly offsetting the reductions are higher projected coarse grain output from ***Ukraine***, ***India,*** and ***Malawi***. The projected foreign coarse grain production is 13.6 million tons higher than a year ago. See table A1 below.

Hot and dry conditions have been present in some areas of the Northern Hemisphere, where winter grain harvests are being tallied, while summer crops such as corn have just passed through critical reproductive growth stages. Some Southern Hemisphere crops are still being harvested (and official statistics are being updated), while other crops are in the early stages of development or await planting for the 2023/24 crop cycle.

This month, global corn production for 2023/24 is projected 11 million tons lower to 1,213.5 million tons, a 5.4 percent increase from a year ago. An increase in ***Ukraine's*** area planted, reported by the Ukraine Ministry of Agriculture (in combination with favorable weather that has lifted yields), has left the country's corn production projection 2.5 million tons higher than last month. ***Canada's*** corn production is also revised 0.3 million tons higher, as favorable growing conditions in Ontario have boosted yield expectations. The increases in corn production from ***Ukraine*** and ***Canada*** are more than offset by reductions from the ***European Union***, ***China***, ***Russia,*** and ***Vietnam***. ***China's*** extreme wetness (resulting from above normal rainfall and tropical storms) has impacted some of its corn-producing regions, causing corn production to be down 3.0 million tons this month. In contrast, the ***EU's*** projected corn production is reduced by 3.7 million tons, as high temperatures and dry conditions in the region reduce corn prospects. Reduced corn area has lowered corn production for ***Russia*** by 1.7 million tons this month.

Global sorghum production for 2023/23 is also projected lower for August, with a 0.8 million ton reduction—driven by reduced prospects in the ***United States***, ***Bolivia,*** and the ***European Union***.

Barley production for 2023/24 is revised lower for several countries this month. Drought conditions including hot temperatures and dry soil moisture in ***Spain***, ***France,*** and ***Germany*** (accounting for 60 percent of barley production in the ***European Union)*** support lower projected barley yields this month and contribute to a 2.0-million-ton reduction in production. A similar weather pattern for some parts of the Canadian Prairies has also reduced ***Canada's*** barley prospects by 0.6 million tons on lower projected yields—while barley prospects for ***Russia*** are expected to reach 19.1 million tons, down 0.5 million tons month over month. Foreign barley production changes are partly offset by small increase in ***U.S.*** barley production that result in a net 3.1-million-ton reduction in projected global barley output.

Hot and dry growing conditions in the Northern Hemisphere contribute to a reduction in global oats production for 2023/24, down 1.5 million tons this month. Major contributors to lower global oats production include the ***European Union***, with a reduction of 0.7 million metric tons, as a result of lower yield and area in a number of countries (leaving the ***EU*** oats production down 11 percent from a year ago). Oats production for ***Russia*** is also revised down 0.6 million tons this month, leaving 2023/24 production 1.0 million tons lower than a year ago at 3.5 million. A 0.2-million-ton reduction in oats output for ***Canada*** leaves the country's production down more than 46 percent year over year and at the lowest level since 2010. Similarly, the ***EU*** projected rye production for 2023/24 is revised 0.4 million tons lower—which when combined with a 0.1-million-ton reduction in ***Russia's*** rye production—leaves global rye production down 0.5 million tons.

For more information and a display of this month's output changes by country and commodity, see table A2.

Several changes in global coarse grain production have been made for 2022/23, which have increased carryover to 2023/24. Details on the production changes for 2022/23 can be found in table A3.

For a visual display of this month's country changes in corn and barley production, see maps A and B below.

Table A1 - World and U.S. coarse grain production at a glance (2023/24), August 2023					
	Region or country	Production	Change from previous month[1]	YoY Change[2]	Comments
		Million tons			
Coarse grain production (total)					
↓	**World**	**1,497.3**	**-16.1**	**+54.0**	
↓	**Foreign**	**1,098.5**	**-10.4**	**+13.6**	Partly offsetting changes are made for a number of countries and commodities. See table A2.
↓	**United States**	**398.8**	**-5.7**	**+40.4**	See section on U.S. domestic output.
World production of coarse grains by type of grain					
			CORN		
↓	**World**	**1,213.5**	**-11.0**	**61.7**	
↓	**Foreign**	**829.7**	**-5.7**	**+26.6**	Lower corn production in the European Union, China, Russia and Vietnam is partly offset by increases in corn production for Ukraine, Canada and Malawi. See table A2.
↓	**United States**	**383.8**	**-5.3**	**+35.1**	See section on U.S. domestic output.
			BARLEY		
↓	**World**	**142.6**	**-3.1**	**-9.1**	
↓	**Foreign**	**138.7**	**-3.2**	**-9.2**	Lower projected barley production in the European Union, Canada and Russia—as well as small changes in Uruguay, Moldova and Colombia. See Table A2.
↑	**United States**	**3.9**	**+0.1**	**+0.1**	See section on U.S. domestic output.
			OATS		
↓	**World**	**21.0**	**-1.5**	**-4.5**	
↓	**Foreign**	**20.3**	**-1.5**	**-4.4**	Lower production is projected for the European Union, Canada and Russia. See table A2.
↓	**United States**	**0.7**	**Fractional**	**-0.1**	See section on U.S. domestic output.
			SORGHUM		
↓	**World**	**62.7**	**-0.8**	**+6.0**	
↓	**Foreign**	**52.7**	**-0.4**	**+0.8**	Lower production is projected for Bolivia and the European Union.
↓	**United States**	**10.0**	**-0.4**	**+5.2**	See section on U.S. domestic output.
			RYE		
↓	**World**	**11.7**	**-0.4**	**-0.6**	
↓	**Foreign**	**11.3**	**-0.4**	**-0.6**	Lower production is projected for the European Union and Russia.
	United States	**0.4**	**No change**	**Fractional**	See section on U.S. domestic output.
			MILLET		
↑	**World/Foreign**	**31.7**	**+0.8**	**+0.3**	Higher production in India and Russia.
[1]Change from previous month. [2] YoY: year-over-year changes. [3] Totals may not add due to rounding.					
Fractional changes are made for Mixed Grain and Sorghum.					
For changes and notes by country, see table A2.					
Source: USDA, Economic Research Service calculations based on USDA, Foreign Agricultural Service, *Production, Supply, and Distribution* database.					

Table A2 - Coarse grain foreign production for 2023/24 at a glance, August 2023						
	Type of crop	Crop year	Production	Change in forecast[1]	YoY[2] change	Comments
			Million tons			
2023/24 Crop year						
CHINA						
↓	**Corn**	*Oct-Sep*	**277.0**	**-3.0**	**-0.2**	Less than ideal weather conditions leave China's corn production projected lower, based on reduced yield prospects.
EUROPEAN UNION (EU)						
↓	**Corn**	*Oct-Sep*	**59.7**	**-3.7**	**+7.5**	Multiple revisions are made for a number of countries of the region, resulting in lower area and yield. High temperatures and dry conditions have impacted corn prospects in the region. **Hungary** and **Romania** (two major corn producers in the region) lead the list of changes.
↓	**Barley**	*Jul-Jun*	**48.4**	**-2.0**	**-3.3**	Drought conditions and extreme temperatures have lowered yield prospects, impacting barley production for a number of countries—with Denmark, Germany and Romania leading the list.
↓	**Rye**	*Jul-Jun*	**7.4**	**-0.4**	**-0.2**	Partly offseting revisions are made for a number of countires in the region, resulting in slightly lower area and yield.
↓	**Oats**	*Jul-Jun*	**6.8**	**-0.7**	**-0.8**	Multiple revisions are made for a number of countries of the region, resulting in lower area and yield.
UKRAINE						
↑	**Corn**	*Oct-Sep*	**27.5**	**+2.5**	**+0.5**	Ukraine's corn production is projected higher, based on increased area planted, reported by the Ministry of Agriculture. Yield prospects are also improved, based on favorable weather and above average crop conditions.
CANADA						
↑	**Corn**	*Sep-Aug*	**15.3**	**+0.3**	**+0.8**	Higher projected yields are based on good growing conditions for Ontario.
↓	**Barley**	*Aug-Jul*	**9.2**	**-0.6**	**-0.8**	Lower projected yields are based on continued dry conditions in major barley producing areas of the South and Central regions of the Prairies (Saskatchwan and Manitoba).
↓	**Oats**	*Aug-Jul*	**2.8**	**-0.2**	**-2.4**	Lower projected yield, based on dry conditions in major growing areas.
RUSSIA						
↓	**Corn**	*Oct-Sep*	**14.6**	**-1.7**	**-1.2**	A revision is based on reduced corn area.
↓	**Barley**	*Jul-Jun*	**19.1**	**-0.5**	**-2.4**	Lower projected barley yields are based on hot temperatures that have impacted the barley crop at various stages of development.
↓	**Oats**	*Jul-Jun*	**3.5**	**-0.6**	**-1.0**	Reduction in final reported oats area and slighlty reduced yield prospects.
↓	**Rye**	*Jul-Jun*	**1.8**	**-0.1**	**-0.2**	Reduction in final reported rye area, partly offset by the increased yield.
VIETNAM						
↓	**Corn**	*May-Apr*	**4.1**	**-0.1**	**-0.3**	A revision, based on lower yield, resulting from mixed weather conditions in the northern and central regions.
MALAWI						
↑	**Corn**	*May-Apr*	**3.5**	**+0.1**	**-0.2**	A revision, based on higher yield, in line with official data.

[1]Change from previous month. Smaller changes are made for several countries, see map A for changes in corn and map B for changes in barley.

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

Source: USDA, Economic Research Service calculations based on USDA, Foreign Agricultural Service, *Production*, *Supply,* and *Distribution* database.

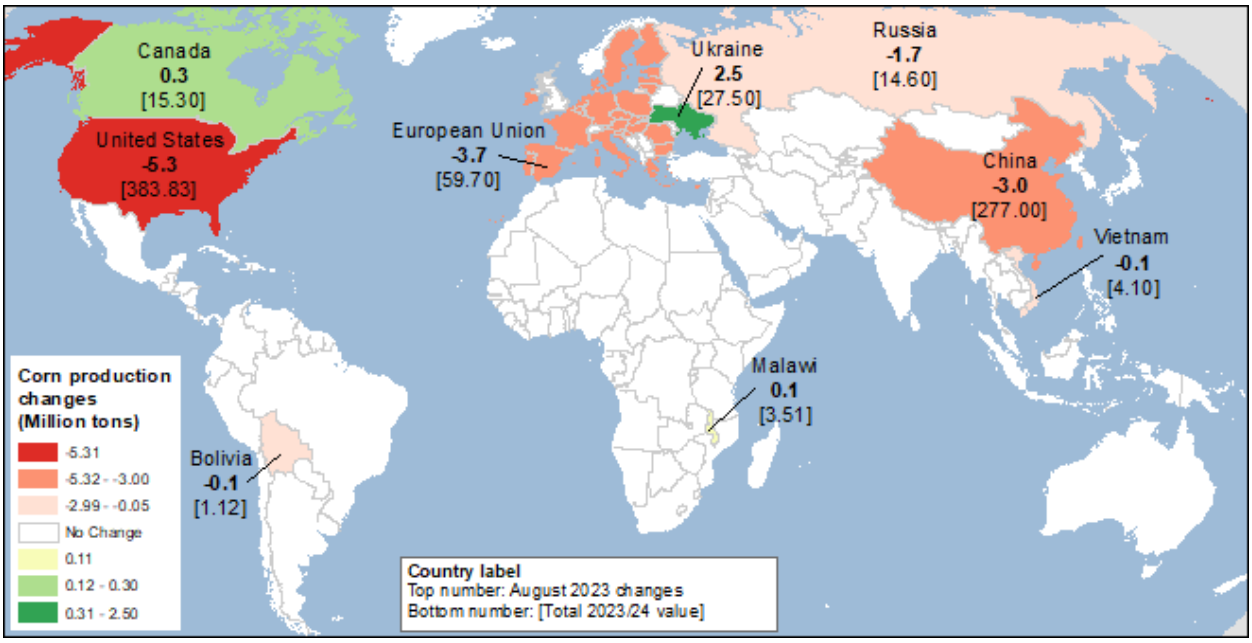
Table A3 - Coarse grain foreign production for 2022/23 at a glance, August 2023						
	Type of crop	Crop year	Production	Change in forecast[1]	YoY[2] change	Comments
			Million tons			
2022/23 Crop year						
BRAZIL						
↑	**Corn**	*Mar-Feb*	**135.0**	**+2.0**	**+19.0**	The increase moves production up 19 million tons from the previous year. Good soil moisture and abundant precipitation for *safrinha* corn growth and development favor higher estimates.
EUROPEAN UNION						
↓	**Corn**	*Oct-Sep*	**52.2**	**-0.7**	**-19.3**	A lower projected yield is in line with official data.
↓	**Barley**	*Jul-Jun*	**51.7**	**-0.1**	**-0.3**	A lower projected area is in line with official data.
↓	**Oats**	*Jul-Jun*	**7.6**	**-0.1**	**+0.1**	A lower projected yield is in line with official data.
URUGUAY						
↓	**Corn**	*Apr-Mar*	**0.3**	**-0.2**	**-3.8**	A revision, based on lower yields, reported by the Ministry of Agriculture.
VIETNAM						
↑	**Corn**	*May-Apr*	**4.4**	**+0.1**	**Fractional**	A revision, based on higher area and yields.

[1]Change from previous month. Smaller changes are made for several countries, see map A for changes in corn and map B for changes in barley.

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

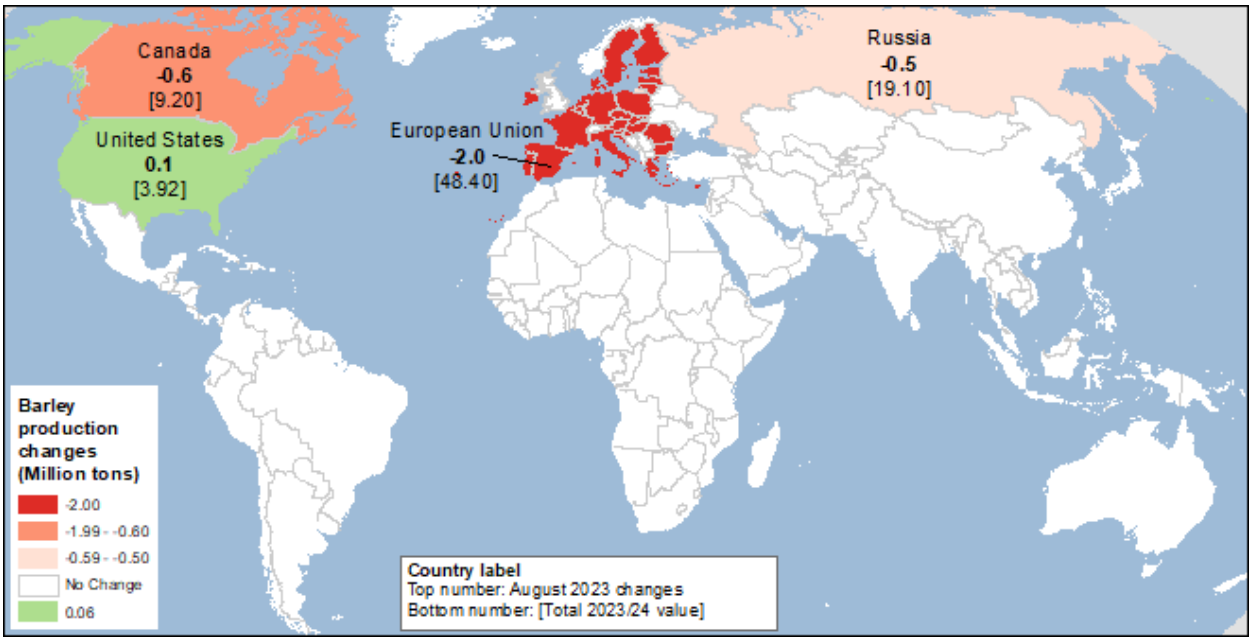
Source: USDA, Economic Research Service calculations based on USDA, Foreign Agricultural Service, *Production*, *Supply,* and *Distribution* database.

Map A – Corn production changes for 2023/24, August 2023



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

Map B – Barley production changes for 2023/24, August 2023



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

Foreign Coarse Grain Use Is Lowered and Stocks Are Up

Global **coarse grain** use in 2023/24 is projected down 10.5 million tons this month. Much of the reduction is due to lower use in the ***European Union*** and ***Russia***, but several other offsetting changes are made for August. Revisions in domestic consumption generally follow changes in respective crop's production and imports but are also impacted by changes in carryover from the previous year. The largest change to 2023/24 domestic use is for the ***European Union*** (down 4.0 million tons for coarse grain), followed by ***Russia*** (with a 2.4-million-ton reduction in projected course grain use).

An increase in global coarse grain beginning stocks (carryover from 2022/23), in combination with lower coarse grain use for 2023/24, have partially offset reduced global production to leave ending stocks 2.9 million tons lower this month. Global coarse grains beginning stocks for 2023/24 are 2.7 million tons higher than last month's estimate, with most of the change coming from increases of 1.4 million tons for the ***United States*** and 1.3 million tons in ***EU*** stocks. The largest changes in 2023/24 coarse grain ending stocks are a 3.0-million-ton reduction in ***China's*** stocks, followed by a 2.5-million-ton increase in ***Ukrainian*** and a 1.5-million-ton decrease in ***U.S.*** coarse grain stocks. See the Domestic Section of this report for more information on ***U.S.*** changes.

Global corn use for 2023/24 is projected 6.3 million tons lower this month. The ***European Union*** leads with a 2.6-million-ton reduction in projected domestic use, most of which comes in the form of reduced feed and residual use. ***Russia's*** domestic corn use is down 1.3 million tons this month, while corn use for ***Algeria*** and ***Vietnam*** is revised down 0.4 and 0.6 million tons, respectively. The reductions are partially offset by a 1.0-million-ton increase in ***Brazil's*** corn use, while ***Canada*** is projected to use 0.4 million more tons of corn in 2023/24.

Several offsetting changes leave global corn ending stocks for 2023/24 projected 3.1 million tons lower this month. The largest change is a 3.0-million-ton decrease in ***China's*** ending stocks, as the country's domestic consumption remains constant, despite lower production and unchanged imports. Corn endings stocks for 2023/24 are revised 1.5 million tons lower for the ***United States,*** 0.6 million tons lower for ***Zambia***, 0.4 million tons lower for ***Russia***, and 0.1 million tons lower for ***India***. These reductions are partially offset by a 2.5-million-ton increase in ***Ukraine's*** stocks. Stocks for ***South Africa*** are also revised up 0.4 million tons for 2023/24. Fractional changes are made this month for corn ending stocks around the world.

Projected global sorghum use for 2023/24 is down 0.7 million tons this month. Changes to sorghum use are led by the ***United States*** and ***Bolivia*** (with a 0.4- and 0.3-million-ton reduction, respectively), followed by the ***EU's*** reduction of 0.1 million tons. ***Ukraine*** and ***Uruguay*** are also revised fractionally lower.

Domestic consumption for **barley** is projected to follow lower production this month, with a 2.7-million-ton decrease for 2023/24. The largest revision is for the ***European Union,*** with a 1.3-million-ton reduction in barley feed use, partially offset by a 0.5-million-ton increase in food, seed, and industrial (FSI) use, to leave domestic consumption 0.8 million tons lower. ***Russia*** is projected to reduce feed use by 0.4 million tons—while ***Canada***, ***China***, and ***Iran*** also reduce projected feed use by 0.3 million tons each.

Global barley ending stocks for 2023/24 are projected down fractionally this month, with several offsetting changes taking place. The ***European Union*** has the largest projected change in ending stocks this month, with an increase of 0.2 million tons, followed by increases of 0.1 million tons each for the ***United States*** and ***Mexico***. The increases are offset by a 0.1-million-ton reduction in stocks for ***Argentina***, ***Canada***, and ***Russia***. Several other countries are changed fractionally.

Global domestic consumption for oats is revised 1.3 million tons lower this month, for 2023/24. The largest projected change is a 0.6-million-ton reduction in feed use for ***Russia***, followed by a 0.5-million-ton reduction in domestic feed use for the ***European Union***. Projected oats use for ***Canada*** is 0.2 million tons lower this month, while ***Brazil*** and ***Uruguay*** are revised fractionally lower. A number of fractional changes are made to 2023/24 ending stocks for oats, which leave global stocks 0.1 million tons higher.

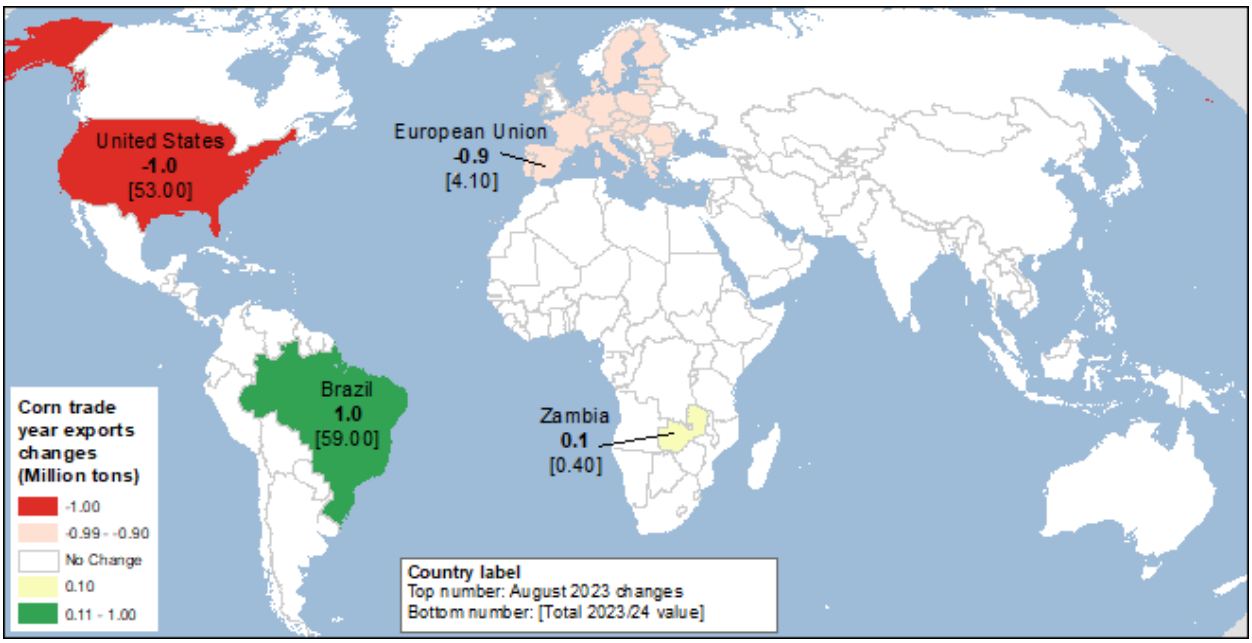
Lower U.S. Exports Drive World Coarse Grain Trade Down for 2023/24

Global coarse grain trade is projected down 1.1 million tons for the 2023/24 October-September international trade year. Small increases in sorghum and oats trade are projected to be more than offset by lower corn and barley trade. Global corn trade is projected lower for the 2023/24 trade year, with corn exports down 0.8 million tons this month. ***Brazil's*** exports are projected 1.0 million tons higher this month, while ***Zambia*** is projected to export an additional 0.1 million tons of corn for the 2023/24 trade year. These increases are offset by lower corn exports from the ***United States*** and the ***European Union,*** down by 1.0 and 0.9 million tons, respectively. ***Egypt's*** corn imports are down 1.0 million tons this month, while ***Algeria*** also decreases imports by 0.4 million tons for the 2023/24 trade year. ***Canada's*** corn imports are projected 0.4 million tons higher this month, while ***Zimbabwe*** is projected to import 0.1 million additional tons and ***Uruguay's*** imports are fractionally higher.

A handful of partly offsetting changes are made to barley trade for the 2023/24 trade year, resulting in a net reduction of 0.3 million tons for global barley trade. The ***European Union*** is projected to increase barley imports by 0.3 million tons to 1.4 million, while ***China*** and ***Iran*** are each projected to see a 0.3-million-ton reduction in imports. The sole change to barley exports for the 2023/24 October-September international trade year is a 0.3-million-ton reduction in ***Canada's*** exports.

For a visual display of this month's changes for 2023/24 in corn exports, see Map C below.

Map C – Corn trade-year export changes for 2023/24, August 2023



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

Special Article: Import Quota Applications Reflect China's Growing Corn Demand

Fred Gale
Joshua Huang

China has become one of the top global corn importers since 2020/2021, driven to a large extent by dual transformations of the country's swine farming and feed milling industries. Imports have exceeded China's 7.2-million-metric-ton annual import quota by a wide margin each year since calendar year 2020, even though no changes in the quota system have been announced.

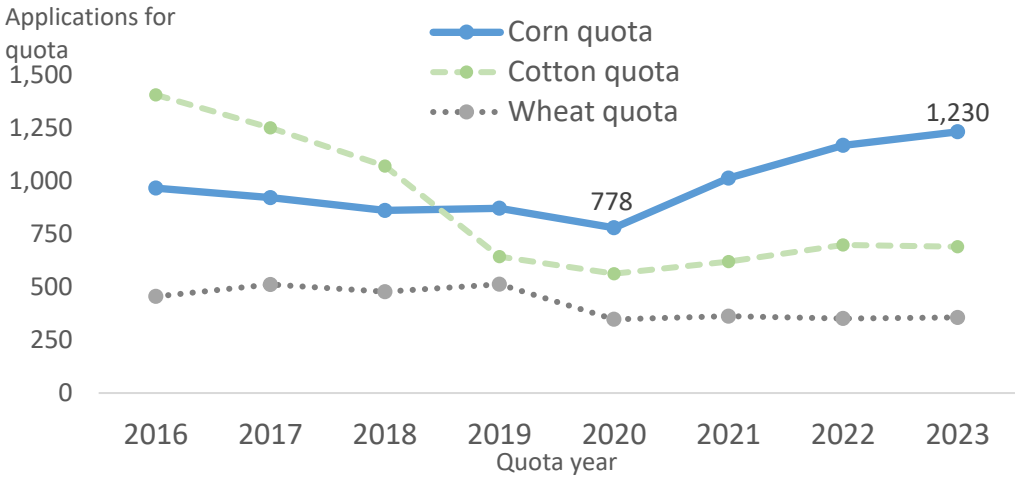
China's corn imports are regulated by a tariff-rate quota system set up in 2001, when the country joined the World Trade Organization. Each September, prospective importers in China can submit applications for a share of the upcoming calendar year's corn import quota. Chinese officials do not announce the quota distribution or the amount of quota that is actually awarded to applicants, but the lists of applicants for the quota provide insight about the structural changes in China's feed industry.

The growing Chinese demand for corn is reflected by the large number of applicants for the 2023 corn import quota: 1,230 corn users applied for a share of the 2023 quota that would allow the users to import corn during January-December 2023. The applicants reported nearly 378 million metric tons of processing capacity.

Among the commodities covered by tariff-rate quotas (TRQs), the 1,230 applicants for corn quota exceeded the number of applicants for cotton (689 applicants), long-grain rice (395), wheat (356), sugar (346), and short- and medium-grain rice (179). In calendar year 2022, corn imports equaled or exceeded the quota for all TRQ commodities except short- and medium-grain rice. The growing demand for imported corn is reflected by the rising number of applicants. Applicants for the corn quota jumped from 778 to 1,230 between 2020 and 2023 (figure SA1). There has been no comparable surge in applications for other commodities' TRQs. The growing demand for corn imports is consistent with China's emergence as a top global importer since 2020/21 and aligns with higher projected Chinese imports for the 2023/24 market year.

China's corn imports had never reached the 7.2-million-ton quota until calendar year 2020, when imports rose to 11.2 million metric tons. Calendar-year imports then peaked at more than 28 million metric tons in 2021, before dropping to just over 20 million metric tons in 2022.

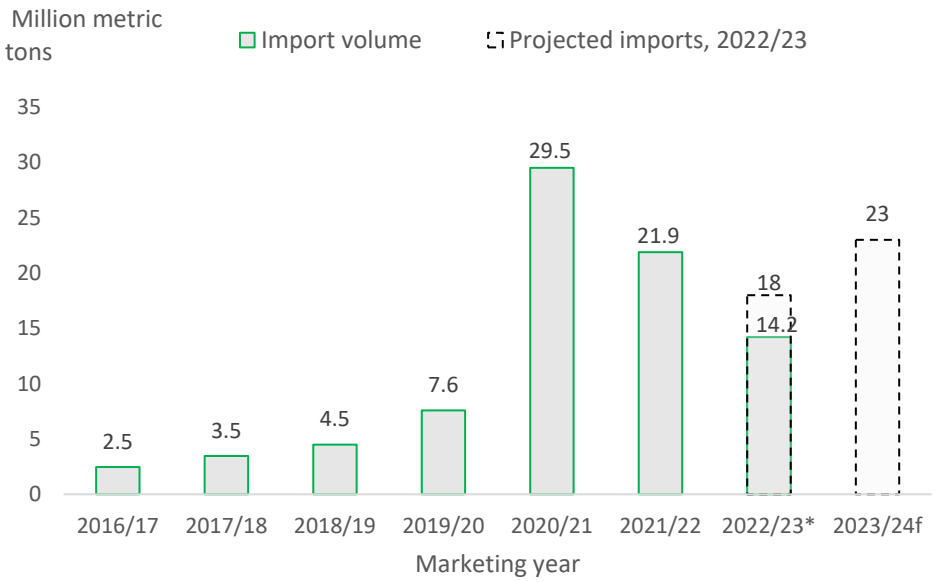
Figure SA1. Number of applications for corn, cotton, and wheat tariff-rate quota, 2016–23



Source: USDA, Economic Research Service, compiled from lists posted on the China National Development and Reform Commission web site.

Imports for the October-September marketing year showed a similar surge to 29.5 million metric tons in 2020/21 (figure SA2). Since then, corn imports have dropped to a projected 18 million metric tons in 2022/23. Actual imports for the first 8 months of the 2022/23 marketing year reached 14.2 million metric tons, about 2.8 million tons behind the previous year's pace. A rebound to 23 million metric tons is projected for 2023/24.

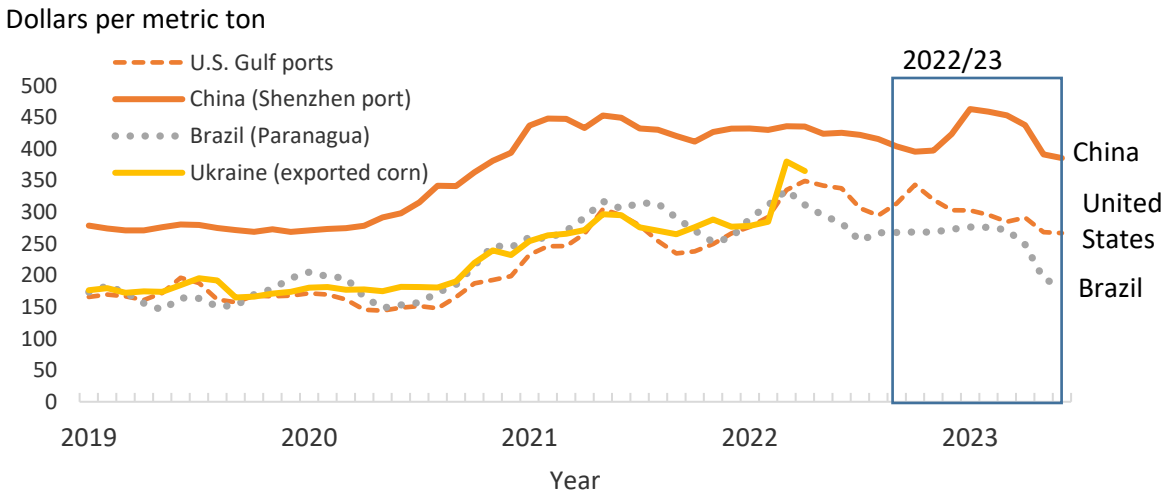
Figure SA2. China's corn imports surged during 2020/21



Note: October-September marketing year. *2022/23 data are through June 2023. 2023/24 is a forecast "f".
Source: USDA, Economic Research Service calculations using data from USDA, *Production, Supply and Distribution* database and Chinese customs data from Trade Data Monitor.

The jump in corn TRQ applicants and imports since 2020/21 corresponds to a tighter corn market in China, signaled by a jump in corn prices for China of more than 70 percent during 2020 (figure SA3). After peaking at $462 per metric tons in January 2021, domestic corn prices in China fluctuated at a relatively high level during 2021–22. Corn prices for the U.S. Gulf, Ukraine and Brazil rose 4 months later, at a more gradual pace than China's prices during 2020, peaking at around $320 per metric ton in May 2021. The surge of imports by China during 2020/21 corresponded to a spread between domestic (China) and imported corn prices, beginning in April 2020. For example, the difference between the price in China's Shenzhen port and U.S. Gulf ports doubled from $110 per metric ton to more than $220 per metric ton between January 2020 and January 2021. Ocean freight rates increased from $32 per metric ton to $42 per metric ton over the same period.

Figure SA3. Monthly corn prices in China, the United States, Ukraine, and Brazil, 2019–23



Note: China's domestic corn price is monthly average spot price in Shenzhen, Guangdong Province. Other prices are FOB prices.
Source: USDA, Economic Research Service analysis of data from Shanghai JC Intelligence Company, Limited (JCI), Food and Agriculture Organization Global Information and Early Warning System (GIEWS) database and Centro de Estudos Avançados em Economia Aplicada (CEPEA), University of Sao Paulo.

Imports slowed during 2021/22 and 2022/23, as the price spread narrowed, but the volume of imports remained high compared to China's pre-2020 imports. Reports of a record harvest for Brazil led to a decline in corn prices during calendar year 2023. Prices in the U.S. and China declined at a more moderate pace. China's approval of corn from Brazil for access to the China market in late 2022 magnified the influence of Brazil's price decline and there were news reports of importers from China switching purchases from corn sourced from the United States to Brazil.

The Black Sea Grain Initiative allowed China to resume large imports from Ukraine, swelling monthly corn imports to a peak of 2-to-3 million metric tons during January-March 2023.

Increased demand for corn in China is driven by the dual trends of an expansion by large swine-producing companies and a maturing feed industry. Feed-milling companies comprised nearly all the applicants for China's corn quota. Applicants also included large livestock companies that use corn to produce feed. Also among the applicants—but fewer in number—were: companies that use corn as a raw material for alcohol and biofuel; companies manufacturing feed additives such as amino acids; food industry producers of starch, citric acid, sweeteners, and monosodium glutamate; several trading companies; and one major seed and farm chemical company.

ERS authors cross-checked the TRQ applicants against industry rankings by *Feed Strategy* magazine (Roembke, 2022) and found that 30 of the world's leading feed companies (with annual production of at least 1 million tons) were represented on the applicant list. Six of the top eight global feed companies were represented among the applicants.

TRQ regulations require each establishment of a multi-plant company to apply for a quota separately. As a result, many companies had multiple applications from their branches at locations throughout China. Establishments operated by the leading 30 feed companies submitted a combined total of 742 applications, accounting for 60 percent of the 2023 corn quota applications. The companies with the most branches applying were Haid (121 branches applied) and New Hope Group (87 branches applied), 2 of the largest feed manufacturers in the world.

More than half of China's 30 top feed milling companies are also top swine producers (marketing at least 1 million head per year) and include the top 6 corn TRQ-applying companies: Haid, New Hope, Twins (75 applications), Wens Foods (58), Muyuan Foods (42), and DBN (37). Muyuan (the largest hog producer in the world) manufactures feed for company-owned farms that produced 61 million hogs in 2022, according to company reports.

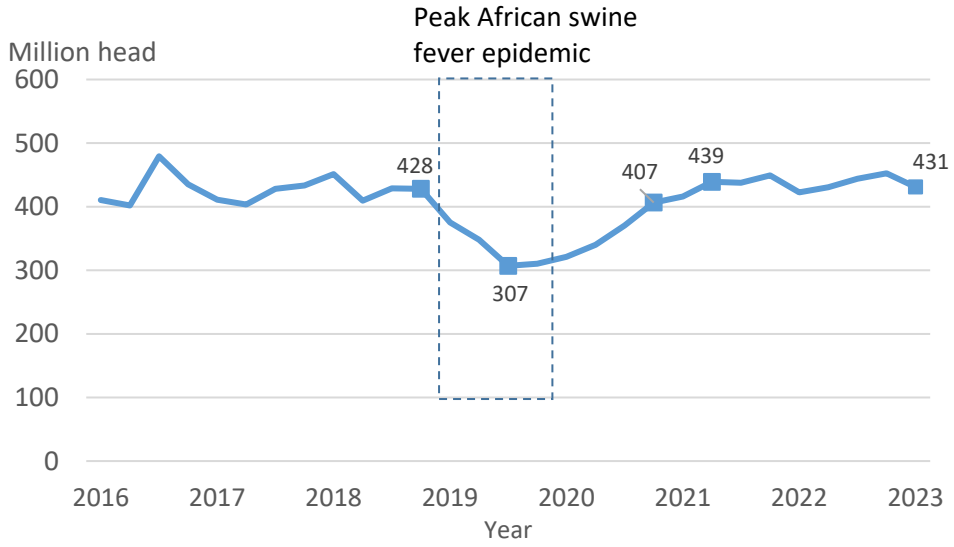
Traditionally, nearly all of China's hogs have been raised by small-scale "backyard" farms in pens and crude barns, often utilizing low-cost ingredients—such as root vegetables, vines, and food scraps. While China's commercial feed sector has greatly expanded during last two decades, the small farmers often switched between commercial feed and low-cost substitutes, depending on hog and feed market conditions. The backyard farms have been declining in number, due to factors such as off-farm migration and stricter enforcement of environmental regulations. According to data from China's Agriculture Ministry, the number of farms raising

less than 500 hogs annually declined about 2-to-3 million each year during 2012–15. The decline accelerated to more than 4.8 million in 2017 and accelerated again during the 2018–19 African swine fever epidemic, when almost 14 million small hog farms disappeared in more than 2 years.

Meanwhile, the number of large farms raising 50,000 head or more has increased every year for the past decade, except during 2019. A record increase of 181 individual 50,000-head farms occurred in 2020. Company financial reports indicate that 16 publicly listed hog corporations increased their combined sales by nearly 30 million head in 2022 and accounted for 18 percent of swine sales in China that year. The shift to large commercial farms in hog production demanded more corn consumption for a given size of herd.

A surge in quota applications by sprawling networks of company subsidiaries corresponds to expansions during the swine industry's recovery from an African swine fever epidemic since 2020 (figure SA4). China's swine herd declined by 121 million head from December 2018 to September 2019. Then the herd expanded by 100 million by December 2020. Since then, the inventory has fluctuated to between 416 and 450 million. The herd numbered 431 million head at the end of March 2023.

Figure SA4. China swine inventory, quarterly, 2016–23



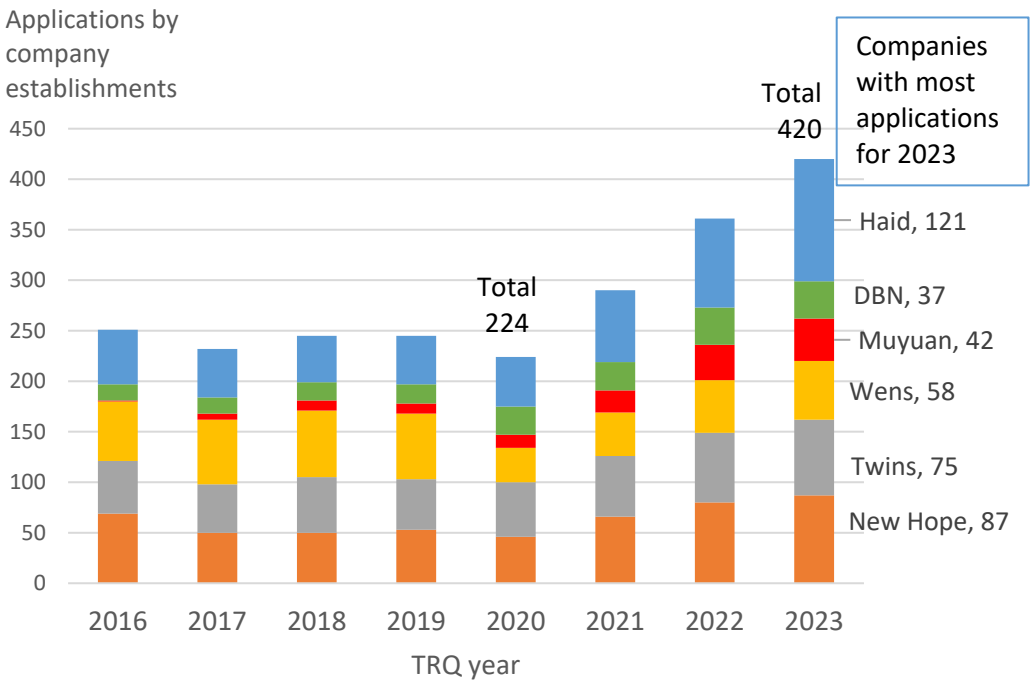
Source: USDA, Economic Research Service, using data from the China National Bureau of Statistics quarterly economic reports.

The number of applications from New Hope, Twins, Wens, Muyuan, DBN, and Haid dipped from a combined total of about 250 applications annually during 2016–19 to 224 during 2020 (figure SA5). The slight dip in applications coincided with a large decline in the swine herd during 2019

(applications for 2020 TRQ were submitted in September 2019) that may have deterred some applicants. A clear increase in applications from these 6 companies occurred each year after that, rising to a total of 420 applications for 2023.

Poultry is also a major consumer of feed in China. New Hope and Wens are top producers of both poultry and swine, often produced by contracting farms with feed supplied by the companies. The top 6 chicken-producing companies (Wens, Wellhope, Sunner, CP, Lihua, and New Hope-Liuhe—plus more than a dozen other chicken producers) were also among the applicants. Most poultry producers had a less extensive network of subsidiary establishments represented than did the swine producers.

Figure SA5. Number of corn tariff-rate quota applications by the top six companies, 2016–23



Note: Applications are submitted by each establishment of a multi-site company during September of the year before the quota will be used.
Source: USDA, Economic Research Service, compiled from lists posted on the China National Development and Reform Commission web site.

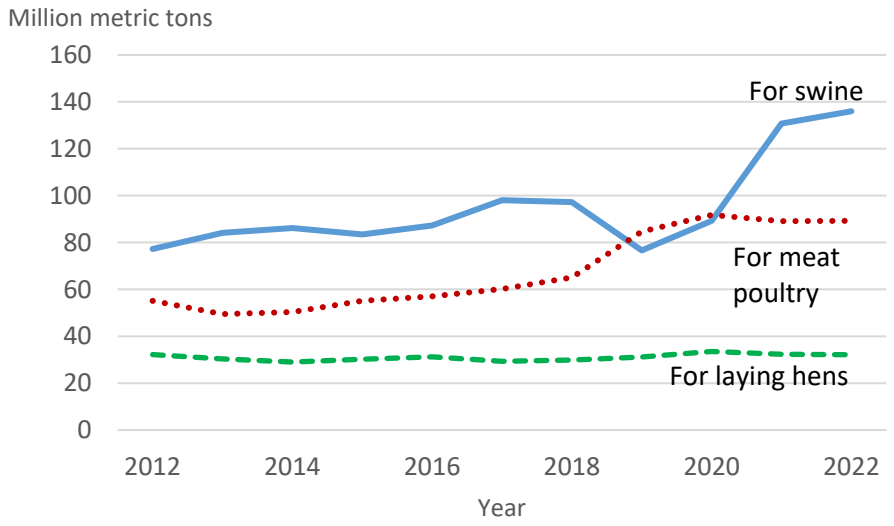
These applicants are primarily large private companies listed on China's stock exchanges. China's Feed Industry Association (CFIA) reported that 36 companies produced at least 1 million tons of industrial feed in 2022 and 6 companies produced more than 10 million tons individually. Company reports from the 2 largest companies show that New Hope Group sold 28.4 million metric tons of feed and Haid sold 21.6 million metric tons in 2022.

Commercial feed data from China's Feed Industry Association show a surge in swine feed production to record levels of 131 million metric tons in 2021 and 136 million metric tons in 2022

(figure SA6). Poultry feed output grew during the African swine fever epidemic of 2019–20 and remained at record levels in 2021–22. Feed output for the first 3 months of 2023 was up 3 percent from the previous year. Feed manufactured in China for swine and poultry was at record levels in 2021 and 2022.

Large feed and livestock companies in China vary their mix of feed ingredients based on market conditions—including sorghum, barley, wheat, broken rice, distillers' grains, and corn. China's Feed Industry Association reported that corn comprised 34 percent of ingredients in compound feed produced by Chinese companies in 2022.[1]

Figure SA6. Feed manufactured for swine and poultry in China, 2012–22



Note: Calendar years.
Source: USDA, Economic Research Service, compiled from China Feed Industry Association reports.

The annual quota has been set at 7.2 million metric tons for each of the last 20 years. Imports outside the quota are subject to a 65-percent tariff that would make imports unprofitable, so the quota appeared to be the ceiling on China's corn imports. Imports never reached the quota until calendar year 2020 when imports exceeded the 7.2-million-metric-ton quota by 4 million metric tons. Then imports exceeded the quota by 21 million metric tons in 2021 and by more than 13 million metric tons in 2022. Imports during 2023 surpassed the quota by more than 4 million metric tons during the first 6 months of the year. As yet, there has been no public announcement of a policy change.

[1] This information is based on China Feed Industry Association (CFIA) monthly reports during January-October 2022. CFIA stopped issuing public reports of corn inclusion after October. The data may not include small mills or on-farm feeding.

The quota regulations specify that 60 percent of the quota must be imported by a single state-owned company—China Oil and Foodstuffs Corporation (COFCO). There are indications that COFCO accounted for big fluctuations in China's corn imports since 2020. Tabulations of Chinese customs data by the importer's province show that corn imports by companies in Beijing grew from 1.5 million metric tons during calendar year 2019 to more than 20 million metric tons during 2022 and totaled 16.5 million metric tons during 2022. Imports by Beijing-based companies accounted for most of the growth in corn imports even though only 8 of the 1,165 applicants for the corn TRQ were located in Beijing. One of the Beijing applicants was COFCO's headquarters.[2] Moreover, tabulations of Chinese customs data indicate that Beijing companies' share of corn imports increased from 32 percent in 2019 to 60 percent in 2020 and 72 percent in 2021, before reaching 80 percent in 2022. Corn imported by Chinese state-owned companies is often used, in part, to replenish Government reserves. For example, industry sources indicate that China's reserve management company sold 2.5 million tons of imported corn from the United States and Ukraine at auctions during 2021–22 to prevent domestic prices from rising (Grain and Oils Market News, 2021; JCI, 2022).

In contrast to COFCO's large share of imports, applications for import quota are made predominantly by private companies—as noted above. At the 2022 annual "two sessions" meeting of National People's Congress (the national legislature) and Chinese People's Political Consultative Conference (the national political advisory body), the chairmen of two leading feed companies (Tongwei and New Hope Group) and the second-largest hog-farming company (Zhengbang) made recommendations for allocating corn import quotas based on company output and opening the market to imports of South American corn (Xin Jing Bao, March 8, 2022 and March 14, 2022; Yonghao Liu, 2022). The suggestions were brought up again at the 2023 meetings.

Profound changes in China's feed and livestock sectors have supported the elevation of China's corn imports to a new, higher level. The expansion of corn import quantities beyond the TRQ indicates that Chinese authorities have temporarily eased limits on corn imports to accommodate booming feed demand. However, no permanent changes in rules—such as expanding the quota or cutting tariffs on all corn imports—have been announced.

[2] Applicant lists also include about 30 COFCO subsidiaries engaged in feed milling and industrial processing, located in various provinces outside Beijing.

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