

# 3 Cereals

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This chapter describes market developments and medium-term projections for world cereal markets for the period 2022-31. Projections cover consumption, production, trade and prices for maize, rice, wheat and other coarse grains. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world cereal markets over the next decade.

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### 3.1. Projection highlights

*Yield growth is driving production, but markets face uncertainties and price volatility*

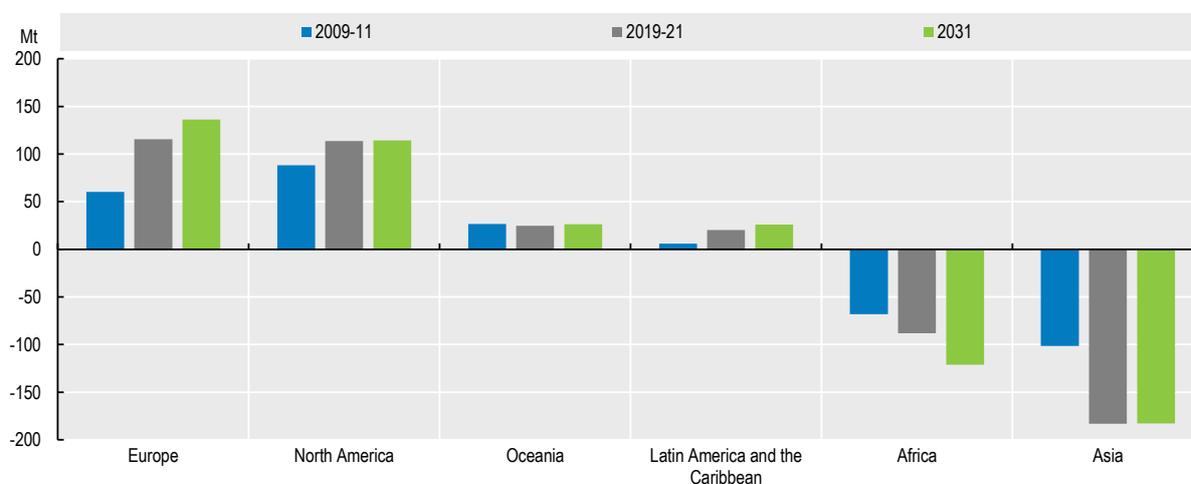
International cereal prices increased through 2021 to close at a nine-year high. Tight global supply combined with strong demand and trade policy uncertainties pushed average wheat and other coarse grains prices up by about 30% compared to calendar year 2020. Maize prices were over 50% higher than in the previous calendar year, mainly driven by production uncertainties in South America, increased production costs and large maize imports by the People's Republic of China (hereafter "China"). In contrast, international rice prices were below their 2020 levels as ample exportable supplies intensified competition among exporters.

Over the next ten years, more global cereal production will originate from yield growth and area intensification given limits on available arable land. Yield improvements are assumed to result from improved and more widely accessible seed varieties, greater efficiency in the use of inputs, and better agricultural practices. However, limited access to new technologies in some countries and a lack of investment could constrain growth. Furthermore, increased environmental concerns, also reflected in new policies (such as EU Green Deal targets) might even lower average yields.

Over the next decade, cereal production is expected to increase by 343 Mt (+ 12%). Almost half of this production increase will come from maize, while wheat and rice account for about 20% each and other coarse grains account for the remaining 10%. More than half of the increase in wheat will come from India, the Russian Federation (hereafter "Russia"), and Canada. The United States, China, and Brazil will account for more than half of the increase in maize production. For other coarse grains (barley, oats, rye, sorghum, millets, and other cereals), the major increase in production will be in India, Sub-Saharan Africa (most notably Niger and Mali), Ethiopia, and Canada, while India, China, and Southeast Asia, including Thailand, Viet Nam, Myanmar and Cambodia, will be the main contributors to increased rice production.

Over the medium term, cereal demand growth should be lower compared to the previous decade, due to the combination of several factors. First, growth in feed demand is projected to slow down. Second, the rate of increase in cereal demand for biofuels and other industrial uses will decrease. Finally, direct human per capita consumption of most cereals has reached saturation levels in many countries. Nevertheless, population growth will increase cereal food consumption in mainly low- and lower-middle income countries. Wheat and rice in particular will remain important components of diets in Asia. Millet, sorghum and white maize will continue to be important staple foods in Africa, with rice also playing an increasingly important role in African diets.

Globally, about 16% of cereal production is traded internationally in 2021, ranging from 10% for rice to 24% for wheat. The share of traded production for cereals is projected to marginally increase to 17% by 2031, largely due to increased trade shares of wheat and rice. In volume terms, net cereal surpluses and deficits show a clear regional pattern (Figure 3.1). However, these patterns differ among cereals. For example, the bulk of the exportable surplus of rice is projected to remain concentrated in Asian countries, while in Latin America and the Caribbean the export of maize is largely compensated by imports of wheat. Overall, several African and Asian countries are projected to become more dependent on cereal imports over the coming decade.

**Figure 3.1. Cereal net trade by continent**

Note: Europe includes the Russian Federation, Ukraine and Kazakhstan

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

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World cereal trade is projected to increase by 15% to reach 531 Mt by 2031. Wheat will contribute about 40% to this increase while maize, rice and other coarse grains account for 30%, 16% and 8%, respectively. Russia will remain the largest wheat exporter, accounting for 22% of global exports by 2031. The United States will remain the leading exporter of maize, followed by Brazil, Argentina and Ukraine. The European Union, Australia, Russia, Canada and the United States will be the main exporters of other coarse grains. India, Thailand and Viet Nam will continue as leaders in rice exports, with Cambodia and Myanmar playing an increasingly important role. China's feed demand will remain an important factor in cereal markets. While projections assume that Chinese maize and wheat imports are likely to fall below levels defined by the tariff rate quota (TRQ) through 2031, any change in this assumption would have an impact on grain markets.

Nominal grain prices are likely to remain high for the 2022/23 marketing season but assuming average yields and geopolitical stability they could resume their long-term downward trend in real terms to 2031. Cereal prices have been very volatile due to recent COVID-related domestic and global supply chain disruptions, Russia's war against Ukraine, animal diseases, yield variability, high fertiliser and transport costs, and the macroeconomic environment including high inflation. Those factors could of course alter the prices projected in this *Outlook*. Additionally other elements such as trade disruptions from political instability and efforts to address domestic inflation could severely affect markets. While some countries have expressed their interest in implementing specific strategies focused on controlling domestic prices, such as stock building or export restrictions, in many cases the regulatory framework and its implementation remain unclear. Finally, grain prices could also become more volatile given the increasing exposure of regions experiencing extreme weather events.

## 3.2. Current market trends

### *Steep rise in wheat and maize prices*

Export prices of cereals have been on the rise since mid-2020 and, according to FAO's Cereal Price Index, at the close of the 2021 calendar year reached a nine-year high. While price increases registered during 2020 were largely attributed to disruptions caused by the COVID-19 pandemic and a strong increase in maize imports by China, those registered during 2021 were largely the result of sharp increases in prices of wheat and maize, which outweighed declines in international rice prices. Export quotations of wheat in 2021 rose by 31%, on average, primarily in response to tight global availabilities, especially of high-quality wheat, following reduced harvests in major producing countries, in particular Canada, the United States of America, and Russia.

Strong global demand, especially from the Near East, as well as trade policy uncertainty, provided further underpinning to wheat export quotations. Coarse grain export prices recorded a 42% increase in 2021, mostly reflecting maize production uncertainties in South America, higher costs of inputs and transport, rising energy prices, port disruptions, tighter barley supplies, and competition from strong wheat markets.

On the other hand, international rice prices in 2021 were on average 4% below their level in 2020 due to ample export availabilities, which intensified competition for markets. The dynamics underpinning recent cereal price developments are assumed to be of a short-term nature, with global supply and demand expected to return to less volatile levels in successive years.

## 3.3. Market projections

### 3.3.1. Consumption

#### *Asian countries will lead demand growth of cereals for food and feed*

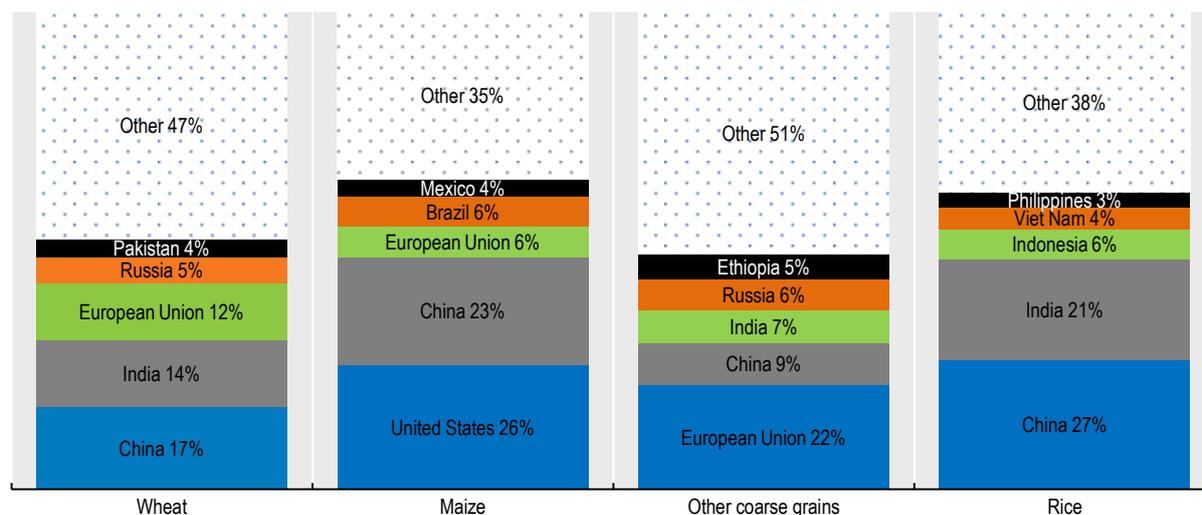
Between 49% and 65% of global *cereal* consumption occurs in the top 5 consumer countries of each commodity, which is less concentrated than production (Figure 3.2). Global use of cereals is projected to increase slightly from 2.8 bln t in the base period to 3.1 bln t by 2031, driven mainly by higher food use (+157 Mt), followed by feed use (+150 Mt). Asian countries will account for more than half of the projected demand increase.

Increased global consumption of cereals for feed is expected to be dominated by maize (1.3% p.a.), followed by wheat (0.8% p.a.) and other coarse grains (0.7% p.a.) over the next decade. However, consumption of cereals for food is expected to increase at a slower rate than in the previous decade.

Wheat consumption is expected to increase by 11% by 2031. Four countries account for 40% of this increase: India (+17 Mt), China (+8 Mt), Pakistan (+6 Mt), and Egypt (+4 Mt). Global use of wheat for food is projected to increase by 57 Mt but to remain stable at about 70% of total consumption; growth will be slower compared to the previous decade as the increase in world population slows down. Feed use of wheat is expected to increase by 20 Mt (Figure 3.3).

Globally, the projected increase in wheat for food is more than two times larger than that for feed, especially in Asia where there is increasing demand for processed products, such as pastries and noodles. These products call for higher quality protein rich wheat, produced in the United States, Canada, Australia, and to a lesser extent in the European Union. Countries in the Middle East, such as Egypt, Algeria, and the Islamic Republic of Iran, will remain major consumers of wheat with high levels of per capita consumption. Global production of wheat-based ethanol is expected to recover as production increases in India and China are offsetting the reduction in the European Union.

Figure 3.2. Global cereal demand concentration in 2031

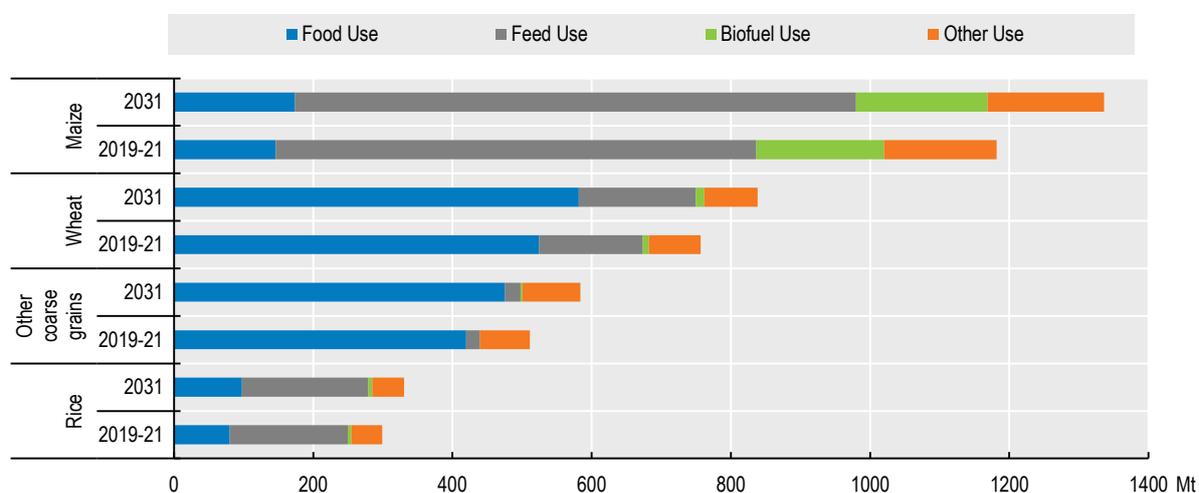


Note: Presented numbers refer to shares in world totals of the respective variable

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

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Figure 3.3. Global cereal use



Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

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Global *maize* consumption is projected to increase by 1% p.a., a much slower pace compared to 2.9% p.a. in the previous decade. This increase is principally driven by higher incomes that translate into higher feed demand, which accounts for the largest share of total utilisation, rising from 58% in the base period to around 60% by 2031. Thirty-three per cent of the increase in feed consumption will be in Asian countries

due to fast expanding livestock and poultry sectors. Feed demand globally is expected to rise by 116 Mt to 806 Mt, mainly in China (+27 Mt), the United States (+26 Mt), Brazil (+9 Mt), India and Viet Nam (+5 Mt each), and Egypt (+4.5 Mt). Consumption in Southeast Asia in particular will increase due to its fast-expanding poultry industry.

The use of maize as food is expected to increase primarily in Sub-Saharan Africa where population growth is strong. White maize in particular, will remain an important staple, accounting for about a quarter of total caloric intake. Overall, growth in maize consumption as food is strongest in African countries at about 1.4% p.a.

Globally, maize use for biofuel production is expected to remain stable as the international ethanol market is restrained by biofuel policies (Figure 3.3). However, maize-based ethanol use is projected to decrease in China and the European Union but to increase in the United States.

World utilisation of other coarse grains is projected to increase by 32 Mt, or 0.9% p.a., over the next ten years, compared to 0.7% p.a. in the previous decade, driven by African and Asian countries (+15 Mt each) while consumption is expected to remain stable in high-income countries. The food share of total consumption is projected to increase from about 27% in the base period to 29% by 2031 because of increased food demand in Africa (+14 Mt). Sub-Saharan African countries, Ethiopia in particular, rely heavily on millet as a food source.

Rice is primarily consumed as a major food staple in Asia, Latin America and the Caribbean, and increasingly in Africa. World rice consumption is expected to increase by 1.1% p.a. as in the last decade, with Asian countries accounting for 70% of the projected increase, largely due to population rather than per capita consumption growth (Table 3.1). Across the various regions, only Africa is projected to see notable increases in per capita food intake of rice. At the global level, the average per capita food use of rice is projected to increase by 1 kg to around 55 kg per year.

**Table 3.1. Rice per capita consumption**

kg/person/year

	2019-21	2031	Growth rate (% p.a.)
Africa	27.3	31.4	1.20
Oceania	13.8	14.1	0.41
North America	6.4	6.7	0.39
Europe	19.2	21.0	0.25
Latin America and Caribbean	27.2	27.0	-0.12
Asia	76.9	78.7	0.15

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

### 3.3.2. Production

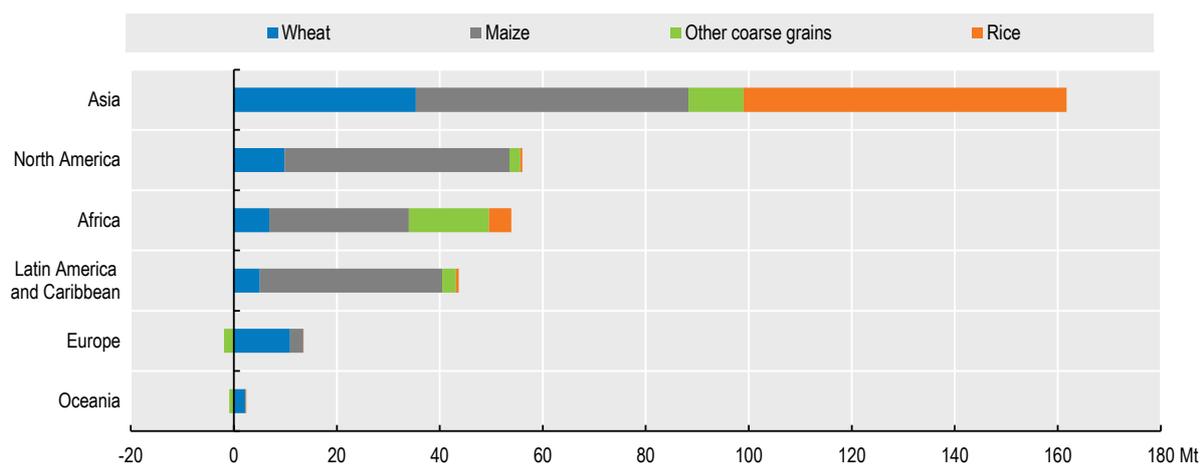
#### *Improved technology and cultivation practices sustain yield and production increases*

The global area harvested to cereals is expected to grow by 19 Mha (3%) by 2031. It will expand mainly in Asian countries by about 9 Mha, notably in India and Kazakhstan. Globally, wheat and maize areas are projected to increase by 3% and 5%, while other coarse grains and rice areas are expected to increase by 2% and 1%. Decreasing harvested areas of rice in China, Viet Nam and Brazil will be offset by gains in India and African countries. With land expansion limited by restricted land availability as compared to the previous decade, the result of constraints placed on converting forest or pasture into arable land, as well as ongoing urbanisation, increased global production is expected to be largely driven by intensification.

Growth in yields, due to improving technology and cultivation practices in middle-income countries in particular, is expected to sustain future cereals production. Globally, yields are expected to grow between around 6% for wheat, 7% for other coarse grains, 8% for maize, and 12% for rice.

Global *wheat* production is expected to increase by 70 Mt to 840 Mt by 2031, of which 35 Mt will be in Asia (Figure 3.4), a slower growth rate than in the last decade.

**Figure 3.4. Regional contribution of growth in cereal production, 2019-21 to 2031**



Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

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India, the world's third largest wheat producer, is expected to provide the largest share of the additional wheat supply, increasing its wheat production by 18 Mt by 2031, driven by yield improvements and area expansion in response to national policies to improve self-sufficiency in wheat. There will be significant production increases in Russia (14.1 Mt), Canada (7 Mt), Pakistan (5 Mt) and Kazakhstan (4 Mt). In Russia, India and Kazakhstan, additional areas planted with wheat will account for more than two-thirds of the global area expansion, including for spring wheat planting. China is projected to continue to be the largest producer of wheat by 2031 (Figure 3.5)

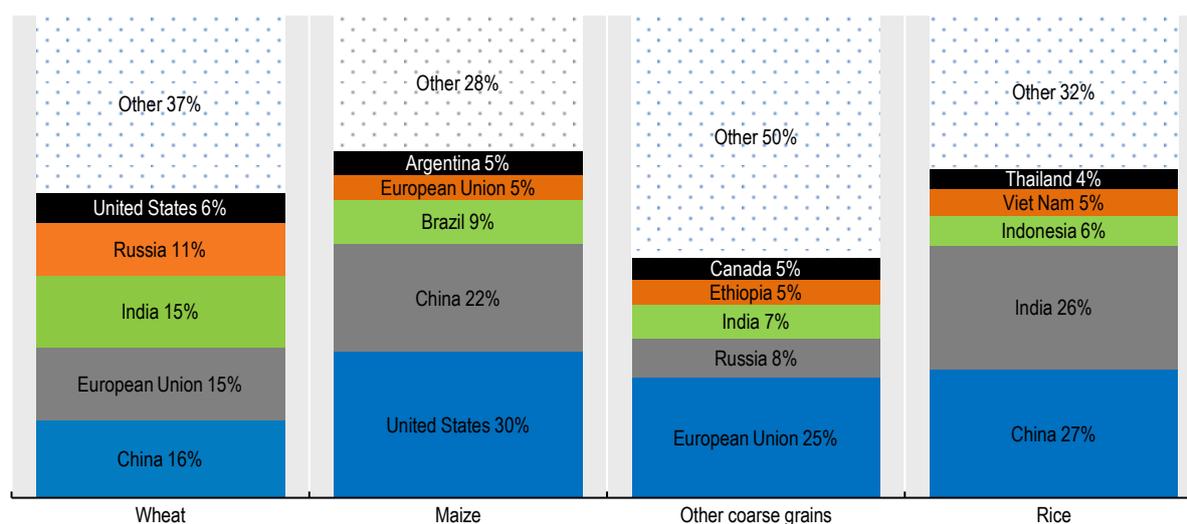
Global maize production is expected to grow by 161 Mt to 1.33 Bnt by 2031, with the largest increases in the United States (50 Mt), followed by China (32 Mt), Brazil (24 Mt), and Argentina (6 Mt). Increased production in Brazil will be driven by higher second-cropped maize following the soybean harvest. Production growth in the United States is expected to slow to 0.6% p.a. over the next ten years, compared to 1.9% p.a. in the previous decade, due to slower growth in domestic demand, particularly for ethanol. Higher yields will be offset by a decline in planted area in competition with soybeans in the United States.

In Sub-Saharan Africa, total maize output is projected to increase by 25.8 Mt, of which white maize – a major staple crop in the region – will account for the largest share. Increases in maize production are expected to stem primarily from yield improvements.

Maize production in China decreased between 2015 and 2018 due to policy changes in 2016 which reduced price support to end stock piling; these were replaced with market-oriented purchasing policies combined with direct subsidies to farmers. In 2015, the stock-to-use ratio of maize was estimated at almost 80%, falling to about 53% in the past three years, which is very close to the ratio estimated for the period

2007 to 2009 before stocks started to accumulate. This indicates that the period of releasing temporary stocks appears to be over. A stock-to-use ratio of about 50% is assumed during the outlook period. With Chinese farmers adapting to the new policy, maize production should gain in competitiveness. Indeed, China is projected to contribute the second most (20%) to increases in global maize output after the United States (26%).

**Figure 3.5. Global cereal production concentration in 2031**



Note: Presented numbers refer to shares in world totals of the respective variable

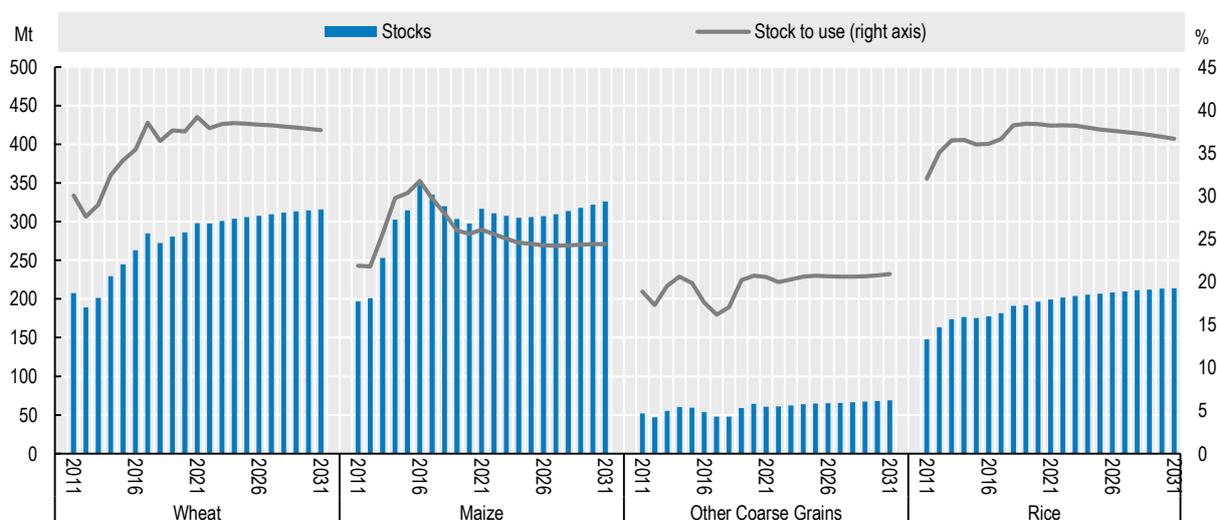
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Global production of other coarse grains – sorghum, barley, millets, rye, and oats – is projected to reach 335 Mt by 2031, up 28 Mt from the base period. African countries will contribute the most (16 Mt). Africa has the fastest growing population and relies on grains such as millet and sorghum, mainly for food. Nearly half of the global production increase of other coarse grains is expected to come from African countries, with Ethiopia contributing an additional 4 Mt to reach 17 Mt by 2031, while India will add 5 Mt. Output in the European Union will not increase compared to the base period which includes the record harvest of 2020 due to slower growth in feed demand and changes in feed composition favouring maize rather than barley. In the United States, production will remain stagnant after historically large harvests in 2021/2022.

Global rice production is expected to grow by 68 Mt to reach 584 Mt by 2031. Production growth in Asian countries, which account for the bulk of global rice output, is expected to be robust. The highest growth is expected in India (+26 Mt), followed by the LDC Asian region (+12 Mt), China (+8.8 Mt), Thailand (+5 Mt) and Viet Nam (4 Mt). India will remain a major producer of indica and basmati rice. Viet Nam is expected to increase production mainly through yield improvements, while the harvested area is expected to decline, assuming government efforts encouraging a shift to alternative crops continue and are effective. China, the world's largest rice producer, is expected to increase production at a slower pace than during the last ten years. Projected output gains in the country are also expected to rely on yield improvements, amid expectations that efforts to move least productive lands out cultivation will continue, as part of broader efforts to improve the quality of rice production. Production in high-income countries, such as Korea, Japan, and the European Union, is projected to fall slightly below the base period's production level while production in the United States and Australia will expand by about 0.3% and 1.7% p.a., respectively.

Figure 3.6. World cereal stocks and stocks-to-use ratios



Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook OECD" Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

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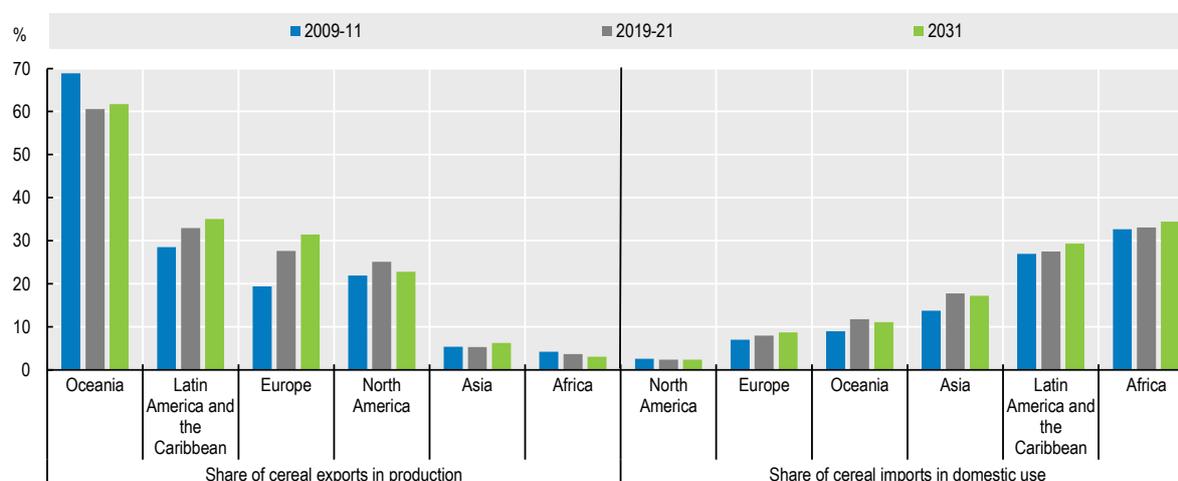
### 3.3.3. Trade

*Global cereals trade will remain buoyant but with changing country shares*

Trade in cereals presently accounts for about 16% of global consumption and is projected to marginally increase to reach 17% by 2031. Traditionally, the Americas and Europe supply cereals to Asia and Africa, where growing demand for food and feed from rising populations and expanding livestock sectors is rising faster than domestic production. This buoyant trend is expected to continue over the next decade with exports of cereals increasing by 15% from the base year to 2031. Figure 3.7 illustrates how important the cereal trade is relative to production and consumption. While net trade of cereals is low for Latin America and the Caribbean and Oceania, the share of cereal exports in domestic production is the highest among all regions. In Latin America and the Caribbean, cereal imports and exports will both represent almost 30% of domestic consumption and production, respectively, by 2031. Amongst all regions, it is Africa where imports of cereals contribute most to domestic consumption and by 2031 almost 35% of domestic cereal use in Africa will originate from non-African countries.

Wheat exports are expected to grow by 28 Mt to 217 Mt by 2031, with Russia expected to maintain its position as the main exporter, accounting for 22% of global exports by 2031 (Figure 3.8).

**Figure 3.7. Trade as a percentage of production and consumption**



Note: These estimates include intra-regional trade except for the European Union.

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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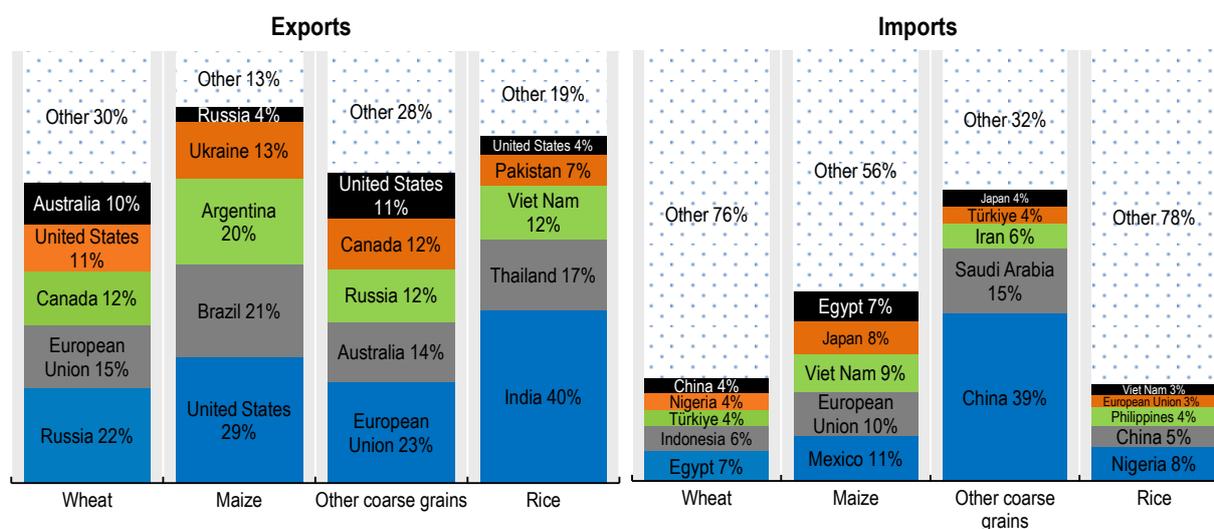
By 2031, the European Union, the second largest wheat exporter, will account for 14% of global trade, although exports are projected to stay below the record volumes of 2019. Compared to the base period, the European Union is losing international market shares mainly because domestic production is anticipated to grow slower. Although the United States, Canada, and the European Union may lose their overall export share, they are expected to retain the higher quality protein wheat markets, particularly in Asia. Russia and Ukraine may play a role in these markets, but will be more competitive in soft wheat markets, such as East Africa and the Middle East. Wheat imports by the North African and the Near East regions will maintain a stable share of 26% of total trade over the next decade.

Maize exports are expected to grow by 22 Mt to 196 Mt by 2031. The export share of the top five exporters – the United States, Brazil, Argentina, Ukraine and Russia – will account for almost 90% of total trade to 2031. The United States is expected to remain the top maize exporter, although below the base year (2019-21) peak and its export share will drop slightly to 29%. Increasing export shares are expected for Brazil (21%) as production of second-crop maize increases. The LDC Sub-Saharan African region will continue to play a major role supplying white maize for food consumption in the region. South Africa will remain a regional supplier, but expansion will be limited as they produce GMO varieties that face restrictions in neighbouring countries.

Mexico is projected to become the largest maize importer as import growth in the European Union is slowing down and China's large imports volumes in 2020 and 2021 which made the country the top-importer are expected to have been a short-term phenomenon. Egypt is expected to surpass Korea and become the fifth largest importer of maize by 2031 (Figure 3.8).

The international trade volume of other coarse grains, dominated by barley and sorghum, is much smaller than for maize or wheat. Exports are expected to increase by 12 Mt to 53 Mt by 2031. The top five exporters – the European Union, Australia, Russia, Canada and the United States are projected to account for 72% of global trade by 2031 slightly above the value in the base period and mainly driven by export increases in Russia. The five major importers – China, Saudi Arabia, the Islamic Republic of Iran, Turkey and Japan – absorb almost 70% of global trade, with China expected to account for 39% by 2031.

Figure 3.8. Global cereal trade concentration in 2031



Note: Presented numbers refer to shares in world totals of the respective variable

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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As it is assumed that maize production in China will increase more significantly than in the past decade, the net-feed deficit of 2021 and 2022 will decrease over the medium term. Maize imports are assumed fall back below its WTO agreed TRQ level to 6.8 Mt in 2031 while imports of sorghum and barley are projected to increase to 19 Mt.

During the past decade, the rice trade grew at 1.9% p.a. This is expected to accelerate to about 2.4% p.a., with overall export volumes rising by 16 Mt to reach 64 Mt by 2031. The export share of the top five major rice exporters – India, Thailand, Viet Nam, Pakistan, and the United States – is expected to increase from 76% to 81%. India is projected to remain the world's leading supplier of rice, while ongoing changes in the varietal make up of production and the increased focus on cultivating higher quality strains could help Viet Nam expand its market share in regions other than Asia. Thailand is projected to continue playing an important global export role but is projected to face more competition.

Less developed countries in Asia, particularly Cambodia and Myanmar are projected to register a strong export expansion, with rice shipments collectively increasing by 55% from 3.8 Mt in the base period to 5.9 Mt by 2031, amid expectations that large exportable supplies will allow these countries to capture a greater share of Asian and African markets. Historically, Indica rice has accounted for the bulk of rice traded internationally; however, demand for other varieties is expected to continue to grow over the next decade.

Imports by China, the largest importer of rice during the base period, are expected to grow only marginally. Imports are projected to increase more significantly in African countries, where growth in demand is expected to continue to outpace production. Nigeria is projected to become the largest importer of rice, increasing imports by 3 Mt to 5 Mt, or the equivalent of 45% of projected domestic consumption by 2031. Overall, imports by African countries are expected to increase from 17 Mt in the base period to 32 Mt by 2031, increasing Africa's share of world imports from 37% to 49%. In addition to China and Nigeria, the group of five major importers in 2031 is projected to include the Philippines, Viet Nam, and the European

Union. These countries are together expected to account for 23% of global rice imports by 2031, a similar share to that of the base period.

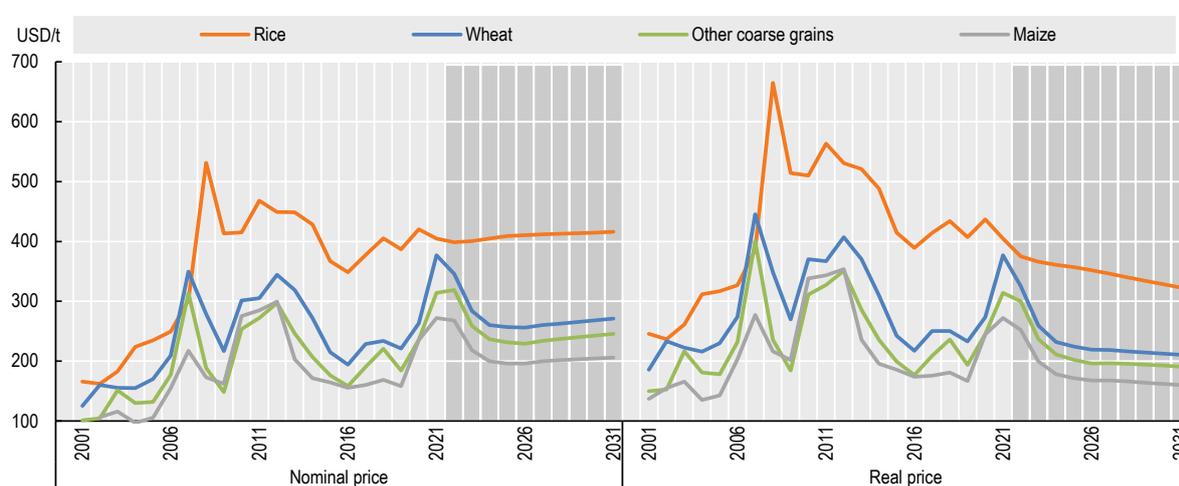
### 3.3.4. Prices

*Prices for cereals in real terms are expected to decline over the next decade*

The world wheat price averaged USD 263/t in the 2021 calendar year, the highest since 2015, and continued to increase in the first months of 2022. Nominal wheat prices are projected to increase above USD 271/t by 2031 due to average harvest expectations and moderate growth in exports and food use.

The world maize price averaged USD 259/t in the 2021 calendar year, the highest level since 2013; Over the medium term, declining stocks combined with strong global feed demand will support maize prices, reaching USD 206/t by 2031.

**Figure 3.9. World cereal prices**



Note: Wheat: US wheat, No.2 Hard Red Winter, fob Gulf; maize: US Maize, No.2 Yellow, fob Gulf; other coarse grains: France, feed barley, fob Rouen; rice: FAO all rice price index normalised to India, indica high quality 5% broken average 2014-2016. Real prices are nominal world prices deflated by the US GDP deflator (2021=1). Rice on secondary axis. Prices refer to marketing years.

Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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The annual average world market price for other coarse grains was USD 273/t in 2021, slightly below the historical peak of 2012. By 2031, the world nominal market price for other coarse grains is expected at USD 245/t, sustained by growing import demand, mainly from China.

The reference export price for milled rice (FAO all rice index normalised to India 5%) moved within a narrow band of USD 387/t and USD 420/t between 2019 and 2021. Over the medium term, although demand from countries in Asia, Africa, and the Middle East is expected to grow, concomitant supply increases in exporters are expected to generate nominal prices of USD 416/t by 2031.

The current economic crisis is expected to see increased grain prices in 2022 and 2023, but over the medium-term prices for wheat, maize, other coarse grains and rice are expected to decline to 2031 in real terms, when adjusted for inflation.

### 3.4. Risks and uncertainties

A much more volatile market and policy environment in the next decade?

More than most other commodities, cereal markets have been and could continue to be markedly affected by the outcome of the war given their strong participation in international markets, especially for wheat and maize, as well as fertilisers and fossil fuels. The production and export growth expectations of both countries, especially for Ukraine, for cereals would be lower than presented in this *Outlook* with a prolonged duration of the crisis. Moreover, with a continuing crisis, countries in East Africa and the NENA region that currently depend on cereal imports from the Black Sea region would need to find new sources of cereals. Rising fertiliser prices due to ongoing supply disruptions, the war, and other factors may lead to decreased yields in the short term, particularly in lower income countries. The resulting increase in commodity prices could exacerbate an already potentially difficult international food security situation.

Several factors could impact on the cereals market that are not reflected in the current projections. While normal assumptions for weather lead to positive production prospects for the main grain-producing regions, extreme weather events accentuated by climate change may cause higher volatility in cereal yields, thereby affecting global supplies and prices. There are heightened risks in some regions of water scarcity, constraining production.

The policy environment will be crucial. The reinforcement of food security and the focus on increased sustainability in anticipated reforms (e.g. the Farm to Fork Strategy in the European Union) as well as policies favouring biofuels (Brazil and India) will heighten competition in the demand for cereals. China's domestic policies, which are an increasing influence on domestic production and import demand, are also crucial for future developments in the cereal markets (Box 3.1). Trade restrictions could provoke market reactions and changes in trade flows such as the past export measures applied to grains and rice. Changing policy related to GMO and gene editing could have a significant impact on the potential for cereals production globally, as could the speed of adoption of available technologies and improved farm practices.

Crop pests and animal diseases are a continuing risk that could disrupt cereal supply and demand. On the supply side, this is the case in regions with limited resources to mitigate the impacts of such events. Examples are the recent locust and fall army worm outbreaks, which have undermined food security in several Asian and African countries. Animal diseases could reduce feed demand, as seen recently with the effects of the ASF outbreak in SE Asia.

#### Box 3.1. The role of China's net-feed-deficit for international grain markets

International grain prices increased strongly during the 2020/2021 marketing season. While further price increases since mid-2021 can be attributed to other drivers (see section 3.1), an important factor behind the price development in 2020/2021 could be the substantial increase in grain imports by China well above levels of the past; imports were largely driven by the gradual rebuilding of Chinese pig herds following the period of African Swine Fever in order to meet the countries demand for feed.

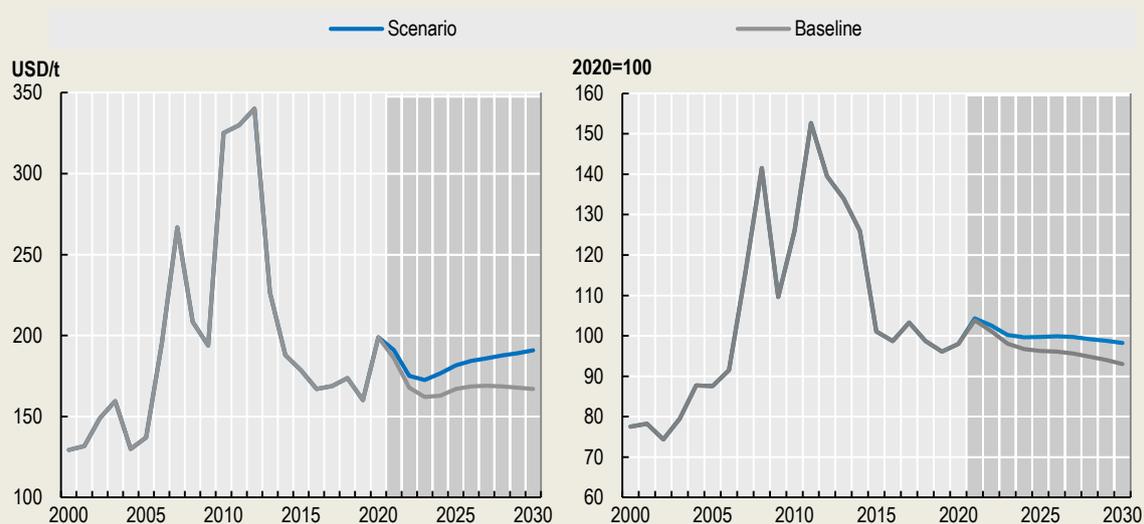
In last year's edition of the *OECD-FAO Agricultural Outlook*, it was assumed that these large trade flows were a short-term phenomenon and imports return to more normal levels. And indeed, grain import levels in 2021 were still elevated but well below the peak in 2020.

Adenäuer (2022) developed a scenario to analyse the possible impact on international grain markets if China remains the leading maize importer and finds that in a situation where China imports more than

15% of global maize trade in 2030, agricultural commodity prices could be between 4% to 25% higher compared to the *OECD-FAO Agricultural Outlook 2021-2030* projections.

These higher prices would challenge the medium-term cereal price story of real decreasing prices over the next decade, which is assumed in this, and recent editions of the *Outlook* as shown in Figure 3.10.

**Figure 3.10. Real world maize price (left pane) and FAO food price index (right pane)**



Source: Aglink-Cosimo simulations based on OECD-FAO Agricultural Outlook 2021-2030 projections.

Source: Adenäuer, M. (2022), "The role of China's feed deficit in international grain markets", OECD Food, Agriculture and Fisheries Papers, No. 172, OECD Publishing, Paris, [2138cc7f-en](#).

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