OECD-FAO Agricultural Outlook 2020-2029

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Food and Agriculture Organization of the United Nations

OECD-FAO Agricultural Outlook 2020-2029

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Foreword

The COVID-19 pandemic is placing unprecedented pressure on global agricultural and food supply chains. As a result, we have witnessed bottlenecks in input industries, agriculture production, food processing, transport and logistics, as well as huge shifts in demand for food and food services. Moreover, countries are implementing measures to address widespread health risks, leading to a dramatic economic contraction that is affecting farmers, workers, and consumers around the world. The challenge for governments is to create a balanced package of policies that address immediate needs and create conditions for the sector to "build back better". Policy makers faced with the uncertainties generated by this unexpected crisis need access to information and analysis to inform their decisions.

The OECD and FAO, along with many other international organisations, are working together to respond to this need. We are closely monitoring short-term market and policy developments. We are also looking beyond immediate challenges and have established a medium-term market outlook, producing a baseline for the next ten years. The baseline focuses on policy options to enable more productive, sustainable and resilient global agricultural and food systems.

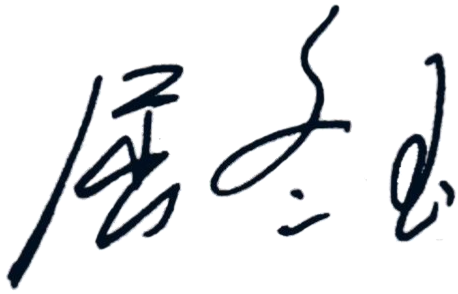
This new edition of the *OECD-FAO Agricultural Outlook* provides a comprehensive medium-term baseline for agricultural commodity markets at national, regional and global levels, along with an initial scenario which explores the impact of COVID-19. This preliminary analysis suggests that dramatically lower economic growth in 2020 could contribute to a further drop in agricultural commodity prices, at least in the short run. If COVID-19 containment measures are effective, and the global economy begins to rebound in 2021, our analysis also suggests that agricultural commodity demand and prices will gradually return to baseline levels over the following years. Assuming global economic growth of 3.4% per annum, and no major disruptions to the international trading system, the *Outlook* projects global agriculture and fisheries production to increase by about 1.4% per year over the coming decade. Productivity growth is expected to continue to outpace growth in demand, and real prices of most commodities covered in the *Outlook* are predicted to decline over the decade.

Our *Outlook* this year also includes new regional briefs and wider commodity coverage. This innovation will broaden the reach of the *Outlook* and support an active dialogue between our organisations, governments, and other stakeholders across the world.

We are committed to support all efforts to mitigate the significant disruptions of the COVID-19 pandemic. We are equally committed to promote and foster the diverse ways in which agriculture supports the livelihoods of hundreds of millions of people globally and the well-being of a world population expected to reach 10 billion by 2050. We support evidence-based decision making on farms and across the entire agricultural and food systems. Informed decisions underpin our efforts towards a more sustainable use of our land, water and biodiversity resources and our collective actions to address climate change.

The *OECD-FAO Agricultural Outlook* provides insights that we hope enhance countries' ability to make informed policy decisions that will benefit both their citizens and the environment, as well as contribute to achieving the SDGs.

Angel Gurría
Secretary-General
Organisation for Economic
Co-operation and Development



QU Dongyu
Director-General
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of the United Nations

Acknowledgements

The *Agricultural Outlook 2020-2029* is a collaborative effort of the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization (FAO) of the United Nations. It brings together the commodity, policy and country expertise of both organisations and input from collaborating member countries to provide an annual assessment of prospects for the coming decade of national, regional and global agricultural commodity markets.

The *Agricultural Outlook* is prepared jointly by the OECD and FAO Secretariats.

At the OECD, the baseline projections and Outlook report were prepared by members of the Trade and Agriculture Directorate: Marcel Adenäuer, Annelies Deuss, Armelle Elasri (publication co-ordinator), Clara Frezal, Hubertus Gay (Outlook co-ordinator), Lee Ann Jackson (Head of Division), Tatsuji Koizumi, Gaëlle Gouarin, Claude Nenert, Ana-Maria Muresan, and Grégoire Tallard of the Agro-Food Trade and Markets Division, and for fish and seafood by Claire Delpeuch and Will Symes of the Agricultural Resources Policy Division. The OECD Secretariat is grateful for the contributions provided by the visiting expert Zhuang Jiayu (Chinese Academy of Agricultural Sciences). The partial stochastic modelling builds on work by the Economics of Agriculture Unit of the European Commission's Joint Research Centre. The organisation of meetings and publication preparation were provided by Helen Maguire, Michèle Patterson, and Helia Mossavar-Rahmani. Technical assistance in the preparation of the *Outlook* database was provided by Karine Lepron, Samuel Pinto Ribeiro, and Eric Espinasse. Many other colleagues in the OECD Secretariat and member country delegations provided useful comments on earlier drafts of the report.

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The complete *Agricultural Outlook*, including the fully documented *Outlook* database that includes historical data and projections, can be accessed through the OECD-FAO joint internet site: www.agri-outlook.org. The published *Agricultural Outlook 2020-2029* is available in the OECD's iLibrary.

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Abbreviations and acronyms

AFOLU	Agriculture, Forestry and Other Land Use
AMIS	Agricultural Market Information System
ASF	African Swine Fever
bln	Billion
bln L	Billion litres
BRICS	Emerging economies of Brazil, Russian Federation, India, China and South Africa
bln t	Billion metric tonnes
CAP	Common Agricultural Policy (European Union)
CETA	Comprehensive Economic and Trade Agreement
CIF	Cost, insurance and freight
CPI	Consumer Price Index
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
c.w.e.	Carcass weight equivalent
DDGs	Dried Distiller's Grains
dw	Dry weight
dwt	Dressed carcass weight
EBA	Everything-But-Arms Initiative (European Union)
EISA	Energy Independence and Security Act of 2007 (United States)
El Niño	Climatic condition associated with the temperature of major sea currents
EPA	US Environmental Protection Agency
EPAs	Economic Partnership Agreements
ERS	Economic Research Service of the US Department for Agriculture
est	Estimate
EU	European Union, except the United Kingdom
FAO	Food and Agriculture Organization of the United Nations
FFV	Flex-fuel Vehicles
FOB	Free on board (export price)
FTA	Free Trade Agreement
g	grams
GDP	Gross domestic product
GHG	Greenhouse gas
GIEWS	Global Information and Early Warning System on Food and Agriculture
GM	Genetically modified
GSSE	General Services Support Estimate
GtCO2-eq	Giga tons of CO_2 equivalents
ha	Hectares
HFCS	High fructose corn syrup
ICAC	International Cotton Advisory Committee
IEA	International Energy Agency
IFA	International Fertilizer Association
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IGC	International Grains Council
ILUC	Indirect Land Use Change

IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ISO	International Sugar Organization
IUU	Illegal, unreported and unregulated (fishing)
kg	Kilogrammes
kha	Thousand hectares
kt	Thousand metric tonnes
LAC	Latin America and the Caribbean
lb	Pound (weight)
LDCs	Least Developed Countries
lw	Live weight
MBM	Meat and bone meal
MENA	Middle East and North Africa
MERCOSUR	Mercado Común del Sur / Common Market of South America
Mha	Million hectares
Mn	Million
Mn L	Million litres
MPS	Market Price Support
Mt	Million metric tonnes
Mt CO2-eq	Million metric tonnes of carbon dioxide equivalent
NAFTA	North American Free Trade Agreement
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
OLS	Ordinary Least Squares
p.a.	Per annum
PCE	Private consumption expenditure
PPP	Purchasing power parity
PSE	Producer Support Estimate
R&D	Research and development
RFS / RFS2	Renewable Fuels Standard in the United States, part of the Energy Policy Act
RTA	Regional Trade Agreements
r.t.c.	Ready to cook
r.w.e.	Retail weight equivalent
SDG	Sustainable Development Goals
SMP	Skim milk powder
SPS	Sanitary and Phyto sanitary measures (WTO agreement)
SSA	Sub-Saharan Africa
t	Metric tonnes
t/ha	Metric tonnes/hectare
tq	Tel quel basis (sugar)
TRQ	Tariff rate quota
UN	The United Nations
UNICEF	United Nations Children's Fund
US	United States
USDA	United States Department of Agriculture
USMCA	United States—Canada—Mexico Agreement
WFP	World Food Programme
WHO	World Health Organization
WMP	Whole milk powder
WTO	World Trade Organization

Currencies

ARS	Argentinean peso
AUD	Australian dollars
BRL	Brazilian real
CAD	Canadian dollar
CLP	Chilean peso
CNY	Chinese yuan renminbi
EGP	Egyptian pound
EUR	Euro (Europe)
GDP	British pound sterling
IDR	Indonesian rupiah
INR	Indian rupee
JPY	Japanese yen
KRW	Korean won
MXN	Mexican peso
MYR	Malaysian ringgit
NZD	New Zealand dollar
PKR	Pakistani rupee
RUB	Russian ruble
SAR	Saudi riyal
THB	Thai baht
UAH	Ukrainian grivna
USD	US dollar
ZAR	South African rand

Summary table for country grouping in the Statistical Annex

Region	Category	Countries
North America	Developed	Canada, United States
Latin America	Developing	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela (Bolivarian Republic of)
Europe	Developed	Albania, Andorra, Belarus, Bosnia and Herzegovina, European Union[1], Faroe Islands, Iceland, Monaco, Montenegro, Norway, Republic of Moldova, Russian Federation, San Marino, Serbia, Serbia and Montenegro, Switzerland, Republic of North Macedonia, Ukraine, United Kingdom
Africa	Developed	South Africa
	Developing	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra-Leone, Somalia, South Sudan, Sudan, Togo, Tunisia, Uganda, United Republic of Tanzania, Western Sahara, Zambia, Zimbabwe
Asia	Developed	Armenia, Azerbaijan, Georgia, Israel, Japan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
	Developing	Afghanistan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Hong Kong China, Macao China, The People's Republic of China, Democratic People's Republic of Korea, India, Indonesia, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Occupied Palestinian Territory, Oman, Pakistan, Philippines, Qatar, Korea, Saudi Arabia, Singapore, Sri Lanka, Syrian Arab Republic, Chinese Taipei, Thailand, Timor-Leste, Turkey, United Arab Emirates, Viet Nam, Yemen
Oceania	Developed	Australia, New Zealand
	Developing	American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall-Islands, Micronesia (Federated States of), Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands
LDC[2]		Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Gambia, Guinea, Guinea-Bissau, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Timor-Leste, Togo, Uganda, United Republic of Tanzania, Zambia
BRICS		Brazil, The People's Republic of China, India, Russian Federation, South Africa

1. Refers to all current European Member states except the United Kingdom.
2. Least Developed Countries (LDC) are a subgroup of developing countries.
Source: FAO, http://www.fao.org/faostat/en/#definitions

Summary table for regional grouping of countries

Region	Sub-region	Countries
Latin America and Caribbean		Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru
	South and Central America and the Caribbean	Antigua and Barbuda, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela (Bolivarian Republic of)
North America		Canada, United States
Sub-Saharan Africa		Ethiopia, Nigeria, South Africa
	Africa Least Developed	Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Sudan, Togo, Uganda, United Republic of Tanzania, Zambia
	Other Sub-Saharan Africa	Botswana, Cabo Verde, Cameroon, Congo, Côte d'Ivoire, Equatorial Guinea, Eswatini, Gabon, Ghana, Kenya, Mauritius, Namibia, Seychelles, Western Sahara, Zimbabwe
Europe and Central Asia		European Union (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden), Israel, Kazakhstan, Norway, Russian Federation, Switzerland, Turkey, Ukraine, United Kingdom
	Eastern Europe	Albania, Andorra, Belarus, Bosnia and Herzegovina, Faroe Islands, Iceland, Monaco, Montenegro, Republic of Moldova, San Marino, Serbia, Serbia and Montenegro, Republic of North Macedonia
	Central Asia	Armenia, Azerbaijan, Georgia, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Near East and North Africa		Egypt, Iran (Islamic Republic of), Saudi Arabia
	North Africa Least Developed	Mauritania, Sudan, Sudan (former)
	Other North Africa	Algeria, Libya, Morocco, Tunisia
	Other Western Asia	Bahrain, Iraq, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Syrian Arab Republic, United Arab Emirates, Yemen
Asia Pacific		Australia, China, India, Indonesia, Japan, New Zealand, Malaysia, Pakistan, Philippines, Korea, Thailand, Viet Nam,
	Asia Least Developed	Afghanistan, Bangladesh, Bhutan, Myanmar, Cambodia, Lao People's Democratic Republic, Nepal, Timor-Leste
	Other Developing Asia	Brunei Darussalam, Democratic People's Republic of Korea, Hong Kong China, Macao China, Maldives, Federated States of Mongolia, Singapore, Sri Lanka, Chinese Taipei
	Oceania	American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands

Executive summary

The *Agricultural Outlook 2020-2029* is a collaborative effort of the OECD and FAO, prepared with input from the experts of their member governments and from specialist commodity organisations. It provides a consensus assessment of the ten-year prospects for agricultural and fish commodity markets at national, regional and global levels. The baseline projections highlight fundamental economic and social trends driving the global food sector.

While the core baseline projections have not been modified to reflect the unexpected conditions created by the current COVID-19 pandemic, they provide a useful starting point for evaluating potential impacts. The immediate implications of the pandemic for global agricultural markets were examined using an initial scenario simulation. In this simulation the projections for the early years of the projection period were adapted using indicators of the pandemic's initial macroeconomic impact. The baseline projections for the latter years of the *Outlook* are consistent with the underlying economic drivers and trends affecting global agricultural markets.

Over the coming decade, the relative importance of food, feed and biofuel use will not change significantly, as no major structural shifts in demand for agricultural commodities are expected. An expanding global population remains the main growth factor although the consumption profiles and projected trends vary depending on the development status of individual countries.

Per-capita food expenditure expands globally, but falls as a share of income, most significantly in middle income countries. Average per capita food availability is projected to reach about 3 000 kcal and 85 g of protein per day by 2029, fats and staples accounting for about 60% of the additional calories. By far the highest growth rate is projected for fats at 9% over the coming decade. Due to the ongoing transition in global diets towards higher consumption of animal products, fats and other foods, the share of staples in the food basket is projected to decline by 2029 for all income groups.

Differing income levels and varying income growth projections between countries will lead to diverging nutritional patterns over the coming decade. In particular, consumers in middle-income countries are expected to use their additional income to transform their diets from staples to higher value products. Environmental and health concerns in high-income countries are expected to support a transition from animal-based protein towards alternative sources, as well as the more immediate substitution away from red meat, notably beef, towards poultry and fish.

Growth in feed consumption is mainly due to the ongoing expansion of the livestock herd and aquaculture production in low- and middle-income countries. The *Outlook* assumes a further intensification of livestock and fish production, combined with ongoing feed efficiency gains these result in a globally fixed relationship between animal food production and the necessary energy and protein feed over the coming decade. The composition of feed rations varies significantly between high, middle and low-income countries because of their ongoing differences in production technology.

Biofuel use of primary agricultural commodities is not expected to increase significantly beyond current levels, mainly due to their declining role in the reduction of greenhouse gas emissions and the declining use of low-blended gasoline-type transportation fuel in two of the main ethanol markets, the United States and the European Union.

About 85% of global crop output growth over the next ten years is attributed to yield improvements resulting from more intensive input use, investments in production technology and better cultivation practices. Further intensification of land use through multiple harvests per year will account for another 10%, while cropland area expansion is projected to account for only 5% and will play a much smaller role than over the last decade, improving the sustainability of agriculture.

Over the outlook period, global livestock production is expected to expand by 14% supported by low feed prices and stable product prices ensuring remunerative profit margins to producers. Poultry remains the fastest growing meat accounting for about half of the projected increase in total meat output. The expansion of pig meat production will be largely concentrated in the People’s Republic of China, which is expected to recover from the ASF outbreak by 2025. Aquaculture production is projected to continue its expansion and by 2024 it is projected to overtake capture fisheries as the most important source of fish worldwide.

Over the outlook period, assuming the continuation of current policies and technologies, production projections imply a growth in direct GHG emissions of 6% compared to the current level. Livestock will account for 80% of this increase. Further reduction in the carbon intensity of agricultural production could be achieved by large-scale adoption of emission reducing technologies. Geographically, most of the increase in direct emissions is projected to occur in emerging and low-income regions due to higher output growth in production systems that are more emission intensive.

Global trade in primary agricultural commodities will increase only marginally relative to production, as without any trade-promoting policy changes, international shipments will be largely determined by total market size. Trade is going to be increasingly important for food security in resource-constrained countries, where imports account for a large share of their total calorie and protein consumption. On the exporter side of the market, trade plays a central role in securing rural livelihoods. A well-functioning, predictable international trading system is essential for both consumers and producers.

Most of the commodities covered in the *Outlook* are expected to see real price declines, suggesting that, under the assumptions made by this *Outlook*, price reducing-factors (mainly productivity improvements) will dominate factors that lead to higher prices, such as resource constraints and higher demand induced by population and income growth.

In April 2020, expert consensus of the impacts of COVID-19 anticipated a contraction in both supply and demand of agricultural products and pointed to possible disruptions in trade and logistics. These disruptions will affect all elements of the food system, from primary supply, to processing, to trade and national and international logistics systems, to intermediate and final demand. An initial COVID-19 scenario provides some preliminary insights into the short-term impacts of the current pandemic on agricultural markets. The scenario illustrates how the COVID-19 pandemic could create a historically significant market shock. In this scenario, agricultural prices fall strongly in response to the COVID-19 induced decline in disposable income, especially in low-income countries. Due to this unprecedented loss in purchasing power, consumer food consumption will decrease despite the offsetting price declines. The initial scenario shows a contraction of demand for vegetable oil and animal products, whereas, the demand for staple food were less affected. While the scenario provides an indication of potential short-term impacts of the disruptions caused by the pandemic, the economic, social and political fallout of the pandemic continues to evolve in extremely complex patterns.

World agricultural markets face a range of other uncertainties in addition to the COVID-19 pandemic. On the supply side, these include the spread of diseases/pest such as African Swine Fever or locust invasions, growing resistance to antimicrobial substances, regulatory responses to new plant breeding techniques, and responses to extreme climatic events. On the demand side, they include evolving diets, reflecting perceptions with respect to health and sustainability concerns, and policy responses to trends in obesity. The digital innovation in agro-food supply chains will have important impacts on both supply and demand. Finally, future trade agreements and changing trade relations between several important players will also impact agricultural markets.

1. Overview

This chapter provides an overview of the latest set of quantitative medium-term projections for global and national agricultural markets. The projections cover consumption, production, trade, and prices for 25 agricultural products for the period 2020 to 2029. The weakening of demand growth is expected to persist over the coming decade. Population will be the main driver of consumption growth for most commodities, even though the rate of population growth is projected to decline. Per capita consumption of many commodities is expected to be flat at the global level. The slower demand growth for agricultural commodities is projected to be matched by efficiency gains in crop and livestock production, which will keep real agricultural prices relatively flat. International trade will remain essential for food security in food-importing countries, and for rural livelihoods in food-exporting countries. World agricultural markets face a range of new uncertainties that add to the traditionally high risks agriculture faces. The most significant source of uncertainties relates to the COVID-19 pandemic that has impacts on consumption, production, prices and trade. Other uncertainties relate to changes in consumers preferences, plant and animal diseases, and the heightened uncertainty with respect to future trading agreements between several important players on world agricultural markets.

1.1. Introduction

The *OECD-FAO Agricultural Outlook* presents a consistent baseline scenario for the evolution of agricultural and fish commodity markets at national, regional and global levels over the coming decade (2020-2029). The *Outlook* thus focuses on the medium term, complementing both short-term market monitoring, outlook publications, and long-term projections. This current edition of the *Outlook* was being finalised under the unique circumstances generated by the COVID-19 pandemic. As the full impact of the pandemic on agricultural and fish markets remain uncertain, at least in quantitative terms, they were not incorporated into the baseline projections. However, an initial scenario presented in Section 1.6 explores the likely macroeconomic impacts of the pandemic on agricultural markets over the short term. The *Outlook* projections for the early years of the projection period thus need to be qualified and remain more uncertain than projections for the later years. However, since agriculture and the overall economy are expected to recover over the next decade, the projections for the following years of the *Outlook* are consistent with the underlying economic drivers and trends affecting global agricultural markets. Therefore, the short-term impacts of the pandemic on agricultural and fish markets do not alter the medium term baseline scenario.

The OECD and the FAO developed the projections in the *Outlook* in collaboration with experts from member countries and international commodity bodies. These are projections, not forecasts, which present a plausible and consistent scenario of the medium term outlook for agricultural commodities. The OECD-FAO Aglink-Cosimo model defines linkages among the sectors covered in the *Outlook* to ensure consistency and a global equilibrium across all markets. It allows follow-up analysis, including an analysis of market uncertainties. A detailed discussion of the methodology underlying the projections as well as documentation of the Aglink-Cosimo model are available online at www.agri-outlook.org. Regional briefs present projection highlights for the six FAO regions. Projections by commodity are discussed in detail in the commodity chapters.

The *Outlook* projections are influenced both by current market conditions (summarised in Figure 1.1) and by specific assumptions concerning macroeconomic developments, the policy environment, technological change, weather, demographic trends, and consumer preferences. Over the outlook period, world population is expected to reach 8.4 billion people; economic growth will continue to be unevenly spread around the world, with robust per capita income growth in emerging markets (more details in Box 1.4). Both population growth and economic growth are the main drivers of demand for agricultural commodities while the assumptions on continued productivity growth and on resource availability are shaping the production of agricultural commodities.

The *Outlook* projections are inevitably uncertain because they extend ten years into the future and are based on assumptions regarding economic and policy conditions. These uncertainties are discussed in detail at the end of this chapter and in each of the commodity chapters. The most significant source of uncertainties obviously relate to the COVID-19 pandemic. While most primary agricultural production may be only marginally affected by the pandemic, interruptions to downstream food processing, trade in agricultural commodities, forced adjustments of consumer demand, and shortages of seasonal labour will certainly impact agricultural and fish markets, especially in the short term, as discussed in Section 1.6.

Figure 1.1. Market conditions for key commodities

Current market conditions

Production Index

Average 2010-2019 = 100

Real Price Index

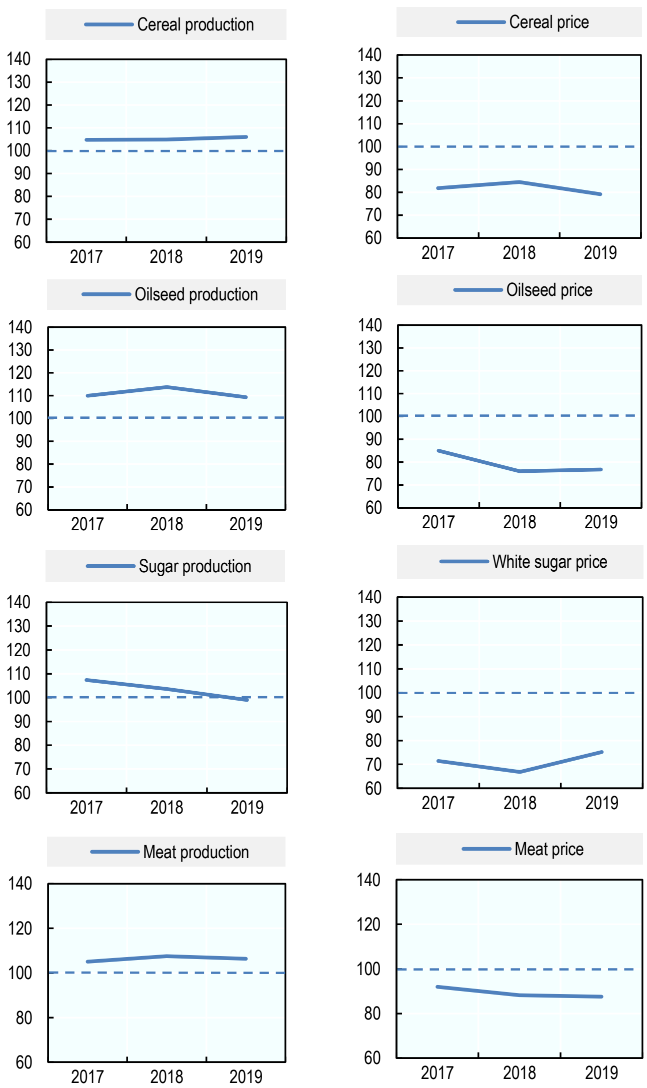
Average 2010-2019 = 100

Cereal: After two years with stable world production of cereals, it increased again in 2019, driven by larger wheat and other coarse grains harvests. In contrast, the maize crop was lower and rice output remained at similar levels as in 2018. Production growth outpaced demand growth, weakening prices. Global cereal stocks fell, almost entirely driven by destocking of maize in China.

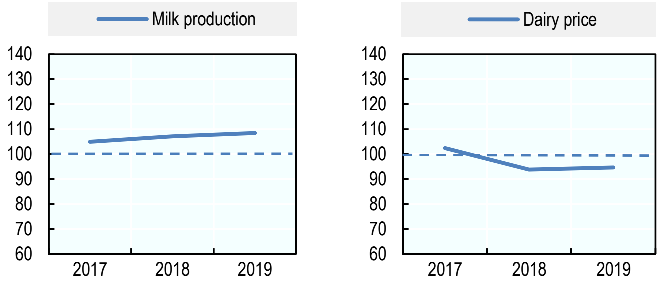
Oilseed: Smaller soybean crop in the United-States and rapeseed crops in Canada and the European Union reduced world oilseed production compared to previous season. Prices of oilseeds and products fared at multi-year lows in 2019, mainly reflecting a slowdown in global demand for oils and meals due to reduced feed demand in China and uncertainties stemming from bilateral trade disputes.

Sugar: After two seasons of production surplus, where India surpassed Brazil as the world top producer, unfavourable weather conditions in Asia and Western Europe (summer 2019) contribute to a large global deficit for 2019-20. Growth in consumption remains strong in many developing countries, while a negative, health-driven trend is observed in countries with high per capita consumption levels. The falling prices of the last two seasons return to an upward trend.

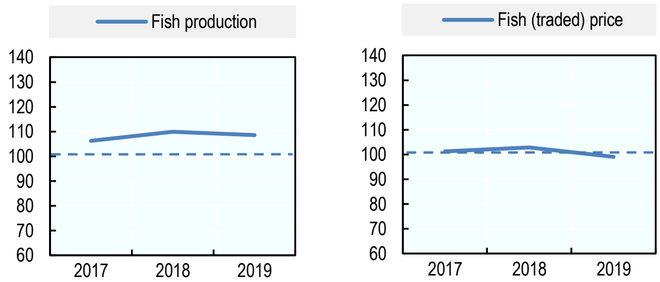
Meat: World meat production decreased by 2% in 2019, this decline is due principally to the impact of ASF in China. China's overall meat output is estimated to have fallen by 10%, which reflects a contraction of at least 21% in pigmeat production. Globally, lower meat production in China was partly offset by increased meat production in Argentina, the European Union, Turkey, and the United-States. As a result, meat price decreased in real terms.



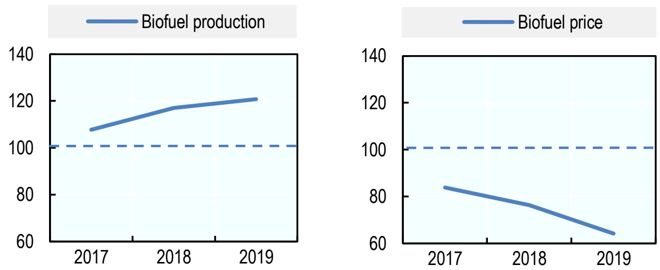
Dairy: World milk production experienced an increase by 1.3% in 2019, fuelled by a strong increase in India, but largely unchanged production in the three major dairy exporters (the European Union, New Zealand and the United-States). While butter prices continued to decline, from their 2017 peak, strong demand for dairy products sustained real prices.



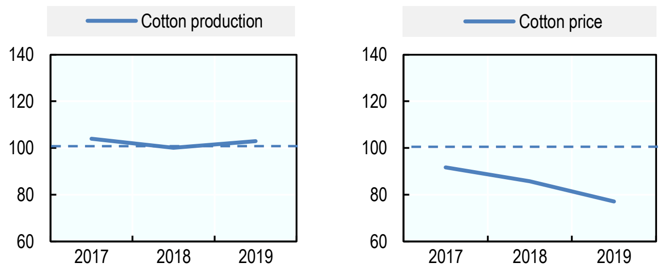
Fish: The global fishery and aquaculture sector slightly declined in 2019, after the rather sustained growth experienced in 2018. However, while aquaculture production continued to expand, capture fisheries declined due to lower catches of selected species. Fish prices were down in 2019, primarily due to price declines for many important farmed species.



Biofuels: Global production increased in all producing regions in 2019. Demand was sustained by obligatory blending and growing total fuel demand. In some countries, increases in mandates and subsidies supported demand for biofuels. Ample supply translated into lower prices for ethanol and biodiesel.



Cotton: Production increased slightly in the 2019 marketing year as harvest were globally better than in the previous year. Consumption grew for all major consumers. Global stocks stagnated in 2019 at about 8 months of world consumption. Prices have been declining but continue to be high compared to polyester, the main substitute for cotton.



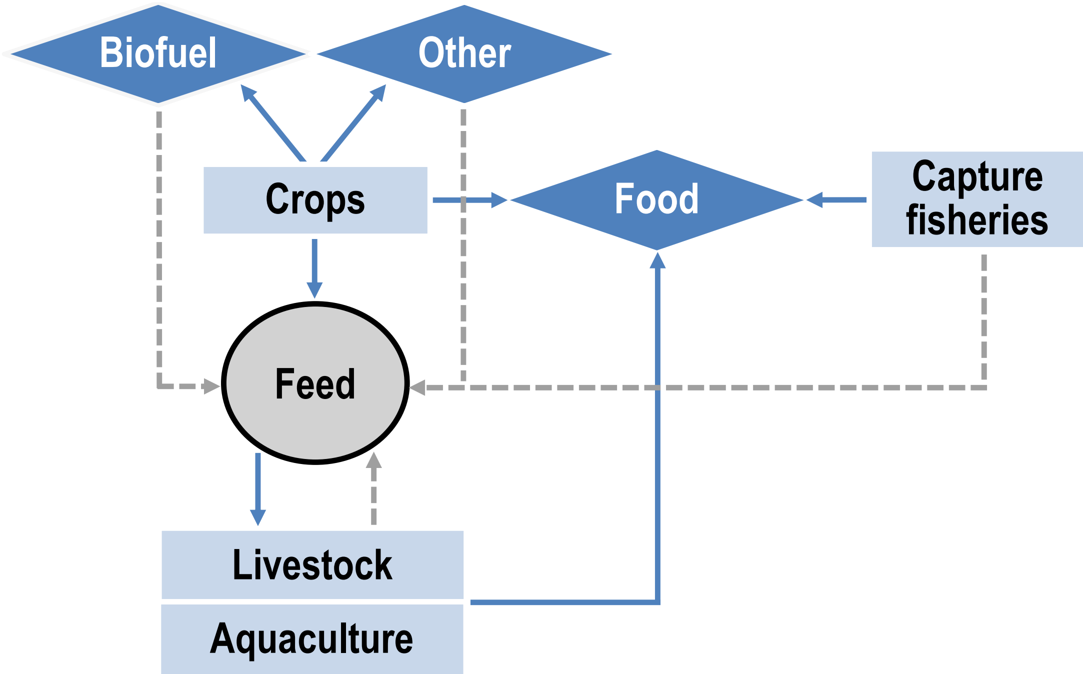
Note: All graphs expressed as an index where the average of the past decade (2010-2019) is set to 100. Production refers to global production volumes. Price indices are weighted by the average global production value of the past decade as measured at real international prices. More information on market conditions and evolutions by commodity can be found in the commodity snapshot tables in the Statistical Annex and the online commodity chapters.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database) http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141038

1.2. Consumption

The *OECD-FAO Agricultural Outlook* projects the use of agricultural commodities as food, feed and raw materials for industrial applications, including biofuel. The baseline covers the direct use of crops as minimally processed food, but also includes first level processing, such as the crush of oilseeds and the subsequent use of the derived products as food and feed. Among livestock products, the food consumption of meat, eggs, fish and dairy products is covered by the *Outlook*. Accounting for direct feed use of cereals, as well as the use of processed products such as protein meal, fishmeal, cereal bran and other by-products in the livestock sector allows the *Outlook* to identify the sector's net contribution to human nutrition. Biofuels have become the dominant industrial use of agricultural commodities in recent years. Their production utilises cereals and sugar crops directly, but also processed products such as molasses and various vegetable oils. "Other" uses, mostly industrial applications of agricultural commodities for commercial production, such as grains for industrial starch production, have also become increasingly important in recent years and are expected to gain importance in the future. The decomposition of commodity consumption into the different categories of use primarily considered in the *Outlook* is shown in Figure 1.2.

Figure 1.2. Main commodity uses by agricultural sector



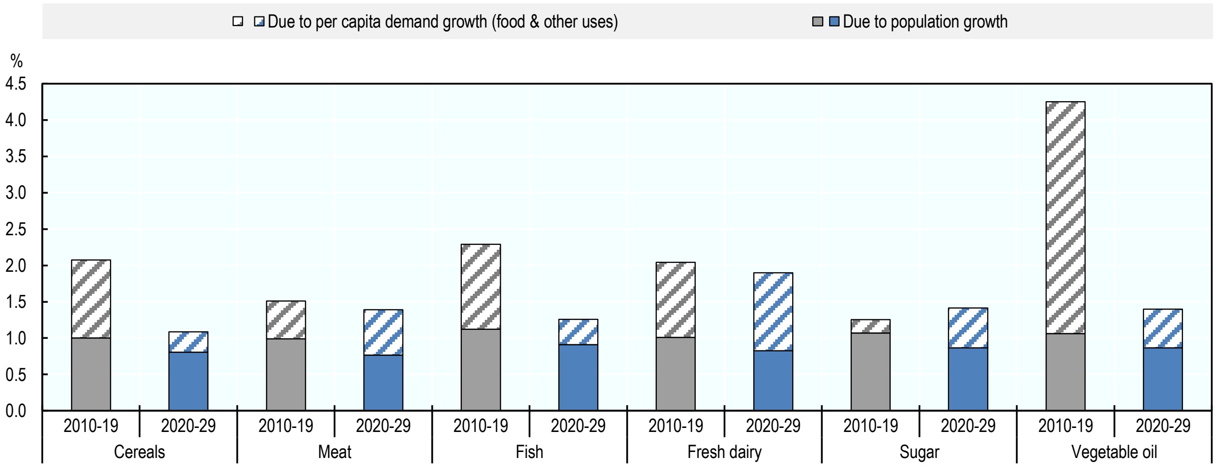
Notes: Boxes indicate agricultural sectors, diamonds refer to final use categories, the circle represents an intermediate use.
Solid lines represent main commodity flows, dashed lines indicate minor or secondary flows. For example, biofuel production (ethanol) is a main use of crops and the residues (DDG) go to feed. Food is the main use of livestock products and a minor part (MBM) flows back to feed.
The final use category "other" refers to seed use, waste and all industrial applications, except biofuel.

What drives changes in global demand for agricultural products and fish?

The demand for agricultural commodities to fulfil the various uses outlined above is influenced by a set of common elements, such as population dynamics, urbanisation, disposable income, consumer preferences, prices, policies and various social factors. These elements will determine the structure of agricultural commodity demand over the coming decade.

Globally, population growth is expected to remain the dominant driver of total agricultural commodity demand over the outlook period, in particular for commodities that have high levels of per-capita consumption in regions with fast expanding populations. For food grains, the importance of population as a driving factor tends to remain high across regions as per capita food demand is stagnant or even decreasing in several high-income countries. For vegetable oils, sugar, meat and dairy products, the impact of population dynamics is lower as income and individual preferences play a greater role (Figure 1.3).

Figure 1.3. Annual growth in demand for key commodity groups



Note: The population growth component is calculated assuming per capita demand remains constant at the level of the year preceding the decade. Growth rates refer to total demand (for food, feed and other uses).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Besides population dynamics, demand growth depends on the individual consumption patterns of the population. These patterns are determined by the respective consumption preferences and the available income to realise them. As a result of global economic development, per capita food expenditures across all income groups are expected to increase in absolute terms with an increasing proportion devoted to higher value items such as vegetable oils, livestock products and fish. However, as incomes rise, people's propensity to spend their extra income on food declines and consequently the food expenditure share in total disposable income falls. Figure 1.4shows this for different groups of countries classified by income.

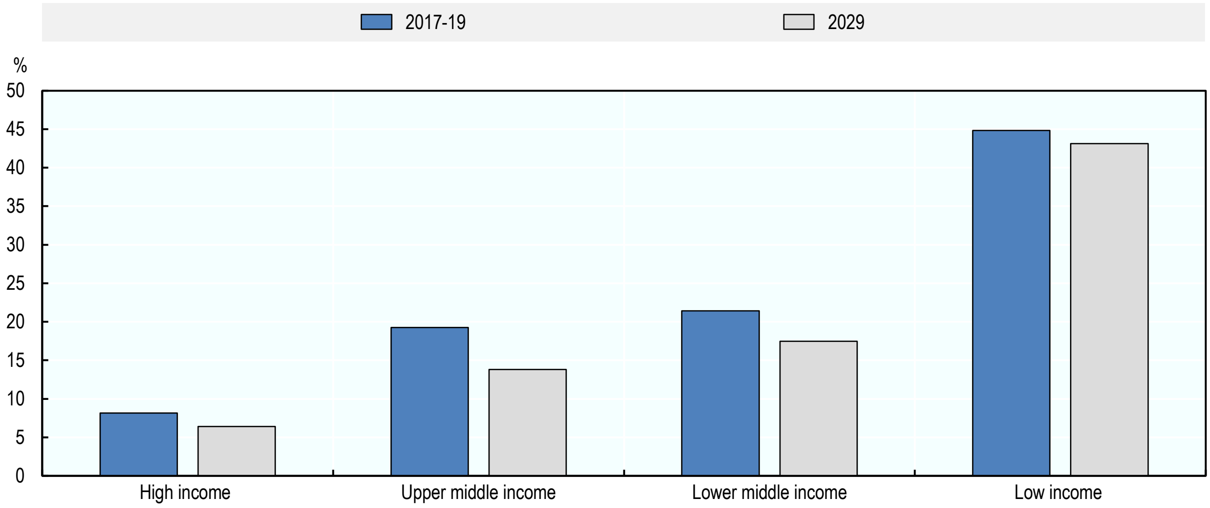
Based on the projected income growth in high-income countries, the share of food in total household expenditure is expected to fall from about 8% in the base period to 6% by 2029.

The absolute decrease is expected to be larger in the emerging economies of upper and lower middle-income countries, where food expenditure shares are expected to fall from 21% to 17% for lower middle-income countries, and from 19% to 14% for upper middle-income countries by 2029 (Figure 1.4).

The projected reduction in the food share of household expenditures will be less pronounced in low-income countries, where per-capita income growth is expected to stagnate during the coming decade. By the end of the projection period, the proportion of household income spent on food is projected to remain on average at 43% in 2029. Food security of people in the lowest income groups in these countries remains very vulnerable to income and food price shocks.

The *Outlook* assumes that developments in the use of agricultural commodities will be additionally shaped by socio-cultural and income-driven changes in consumer preferences over the projection period. The continuing urbanisation and rising female participation in the workforce especially in high-income and emerging economies is expected to contribute to a higher consumption of processed and convenience food, and an increasing tendency to eat outside the home. These trends are underpinning the projected increases in the consumption of sugar and vegetable oils. The effects of ageing populations and more sedentary lifestyles, particularly in high-income countries, are also considered in the projections of daily calorie requirements.

Figure 1.4. Food as a share of household expenditures, by income group



Note: Calculated on per-capita GDP and excludes food consumed away from home.
The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141095

The baseline projections also account for increasing consumer awareness of the links between diets and health, which is expected to boost the consumption of poultry and fish and reduce the consumption of red meat and sugar. Policies seeking to promote healthy dietary choices and curb the consumption of items that may cause overweight, obesity and diet-related non-communicable diseases such as diabetes have been implemented or are being considered in numerous countries, including Chile, France, Mexico, Norway, South Africa, and the United Kingdom. The introduction of food product labels that provide nutrition information as well as regulations limiting the youth-targeted advertising of ultra-processed products are additional measures that have been incorporated into the assessment of future consumer preferences.

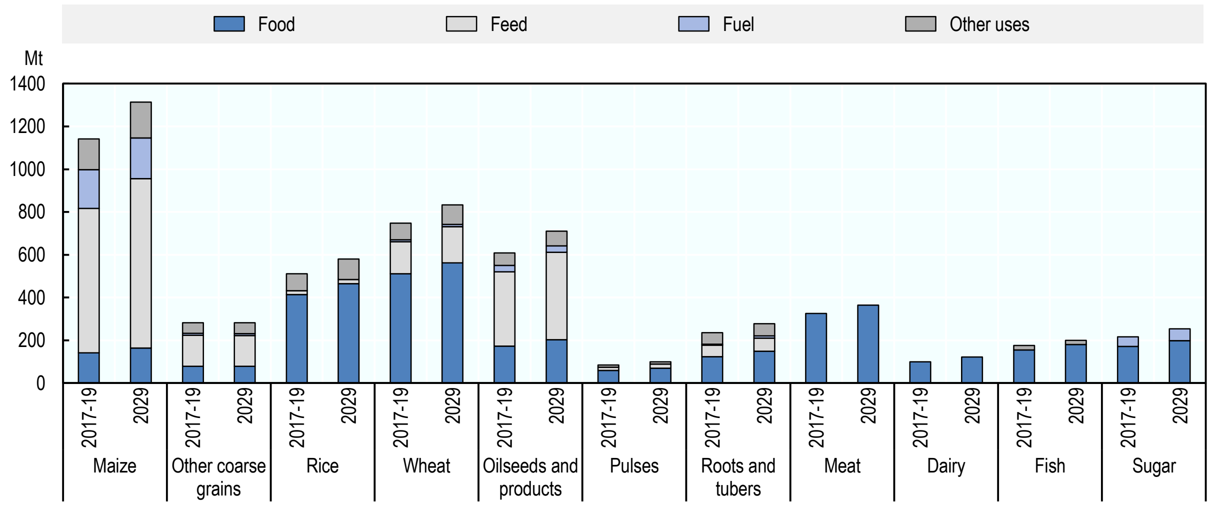
The expectation of a growing awareness of the impact of consumption choices on the environment is moderating the demand growth projections for items such as palm oil, beef, and non-organic cotton. Such concerns are, at the same time, supporting the growing demand for renewable raw products for non-food uses, such as biofuels and industrial applications in packaging, cosmetics or the pharmaceutical industry.

Limited change expected in structure of commodity demand

As shown in Figure 1.2, the *Outlook* accounts for four major use categories of basic agricultural commodities. Food is the primary use of agricultural commodities, currently accounting for 52% of calories produced by global agriculture. Feed is taking up about 31% of calories produced, while the remaining 17% are used as either biofuel, seed, or raw products in industrial applications.

Over the coming decade, the shares of the respective uses by commodity are not projected to change significantly, as no major structural shifts in consumption are expected (Figure 1.5). Food will continue to be the dominant use of food grains (rice, wheat), roots and tubers, pulses, sugar, vegetable oils and all animal products. Feed will continue to be the main use of coarse grains and protein meals.

Figure 1.5. Global use of major commodities

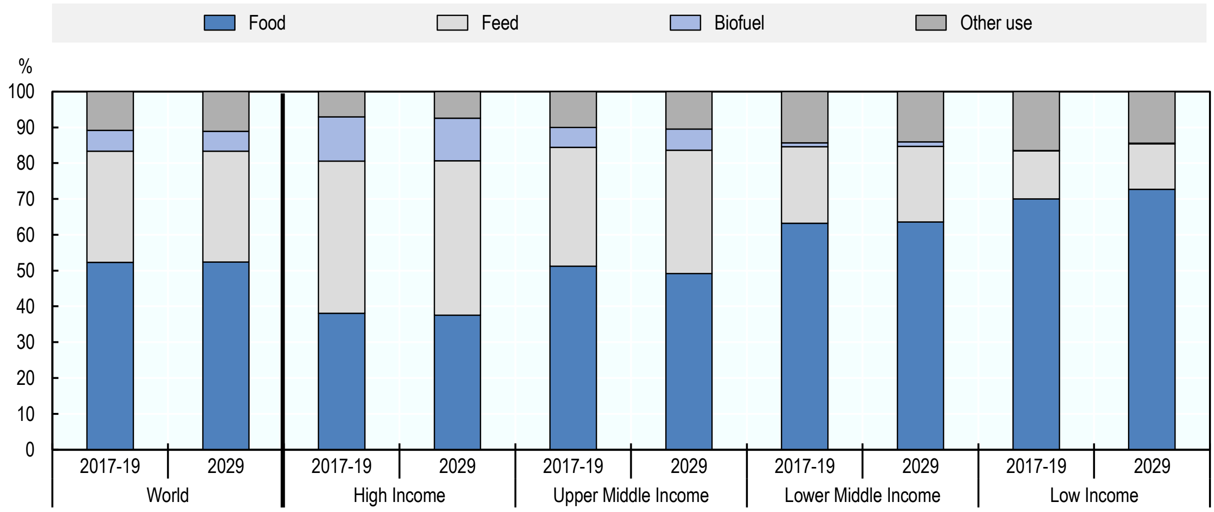


Note: Crushing of oilseeds is not reported as the uses of 'vegetable oil' and 'protein meal' are included in the total; Dairy refers to all dairy products in milk solid equivalent units; Sugar biofuel use refers to sugarcane and sugarbeet, converted into sugar equivalent units.
Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141114

The use of agricultural commodities varies depending on the development status of countries (Figure 1.6). Consumers in low-income countries consume the bulk of their calories from vegetal sources. Their standard of living does not allow them to invest a large share of their domestic crop production into the production of feed for non-ruminant animals, as they cannot afford to consume high-priced calories of animal origin.[1] The food share of the consumed calories is additionally elevated, because livestock products are imported from high-, upper- and lower-middle income countries, where the calories are counted as feed. The food share in low-income countries is projected to rise to 74% by the end of the outlook period, as growth in domestic food demand outpaces the growth in domestic demand for feed and for renewable industrial raw products. By contrast, the structure of demand for agricultural commodities in high-income countries favours further processing, and direct food use accounts for only 43% of total consumption. In North America for example, the sizable biofuel sector as well as the large and feed-intensive livestock sector, take up the bulk of crop production. The feed use of agricultural commodities is also expected to expand particularly in upper-middle income regions over the outlook period, mainly due to export-driven growth in the meat sector. These countries are projected to further capitalise on their resources and competitiveness to capture the additional value of the livestock sector.

Figure 1.6. Uses of agricultural commodities: share of calories, by income group



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141133

Population growth will be the main driver of food use

Population is the key determinant of total food use. Income, relative prices, other demographic factors, consumer preferences and lifestyles, meanwhile, determine a person's desired food basket. On account of an expected 11% expansion in the global population (an increase of 842 million people between 2017-19 and 2029) as well as notable gains in per capita income in all regions, total consumption of the food commodities covered in this *Outlook* is expected to rise by 15% by 2029, as measured on a calorie basis. Asia Pacific, the world's most populous region, will continue to play the most significant role in shaping global demand for food over the outlook period as it is projected to account for 53% of the global population in 2029 (i.e. 4.5 billion people). Given the significant regional differences in demographic developments, income distribution as well as culture-derived consumer preferences, the relative impact of these factors on food demand differs by country and region.

Differing income levels and varying income growth projections will underlie continuing differences in dietary patterns between countries over the coming decade (Figure 1.7).

Globally, aggregated food consumption (measured in calories) is projected to grow by about 3% over the projections period, reaching just over 3 000 kcal in 2029, fats and staples accounting for about 50% of the additional calories. By far the highest growth rate is projected for fats at 9% over the coming decade. Staples remain the most significant food group across all income groups. With the exception of high-income countries, consumers in all other countries are projected to consume more energy from staples. Nevertheless, on the account of the ongoing transition in global diets towards higher shares of animal products, fats, sugar and other foods, the share of staples in the food basket is projected to decline by 2029 for all income groups though at different rates.

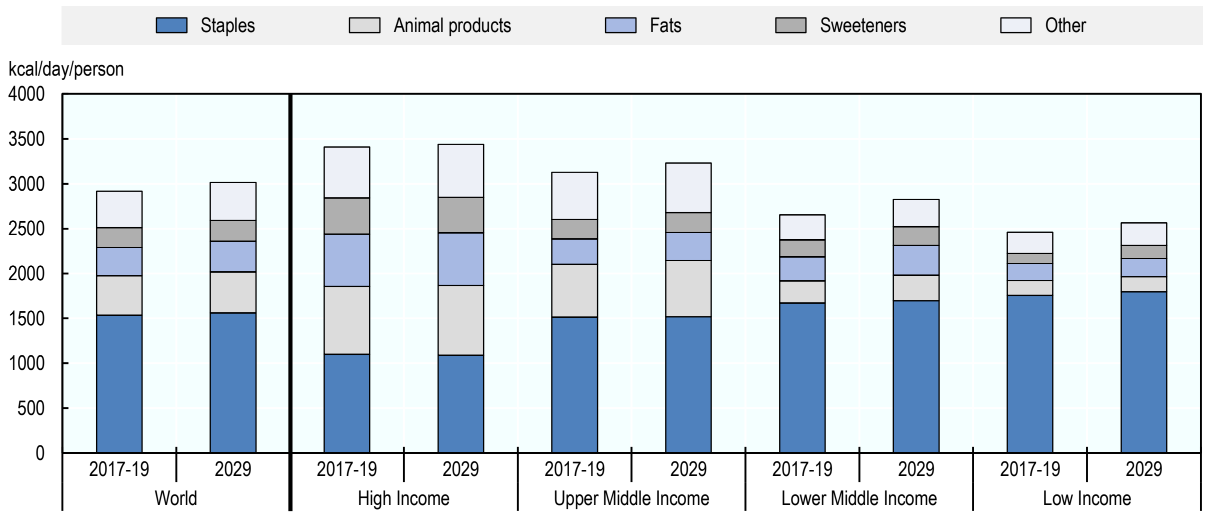
The per capita food energy consumed in high-income countries will remain at current levels. Ongoing income growth and changing consumer preferences will further the substitution of staples, sweeteners and fats for higher-value foods, most importantly foods dense in micronutrient content such as fruits, vegetables, seeds and nuts and, to a lesser extent, animal products.[2] As many of these fruits, nuts and vegetables have to be imported by high-income countries, this shift offers market opportunities for countries with export potential in these commodities. Increased domestic and foreign investments in producing regions (e.g. Sub-Saharan Africa) are expected to develop such market opportunities. Growth in the consumption of animal products will be limited by near saturation levels of consumption of meat and dairy products as well as increasing health and environmental concerns.

In upper-middle income countries, total food consumption is expected to expand by about 4% by 2029. Based on the strong preferences for meat in many of these countries, 38% of the additional calories will be provided by animal products and 26% by fats and other foods.

Consumers in lower-middle income countries are projected to increase their food consumption by 7% (173 kcal) over the coming decade, the largest gain of all four income groups. However, due to limited disposable income, fats and staples will still account for half of the increase, while the growth in the consumption of relatively more expensive options such as fruits, vegetables and animal products will remain limited.

Average diets in low-income countries remain heavily based on staples, which will continue to provide 70% of daily calories. Almost 40% of additional calories over the coming decade are still expected to come from cereals, and roots and tubers. The second most important source of calorie growth will be sweeteners, accounting for 30% of the total increase. Growth in the consumption of animal products and other high value foods (e.g. fruits and vegetables) will, however, remain limited due to income constraints. Given the higher cost of these food items, consumers in lower-middle and low-income countries will only be able to take a small step towards more diversity in their diets.

Figure 1.7. Per capita consumption of main food groups (calorie equivalent), by income group



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000. Staples includes cereals roots and pulses. Animal products include meat, dairy products (excluding butter), eggs and fish. Fats include butter and vegetable oil. The category others include fruits, vegetables etc.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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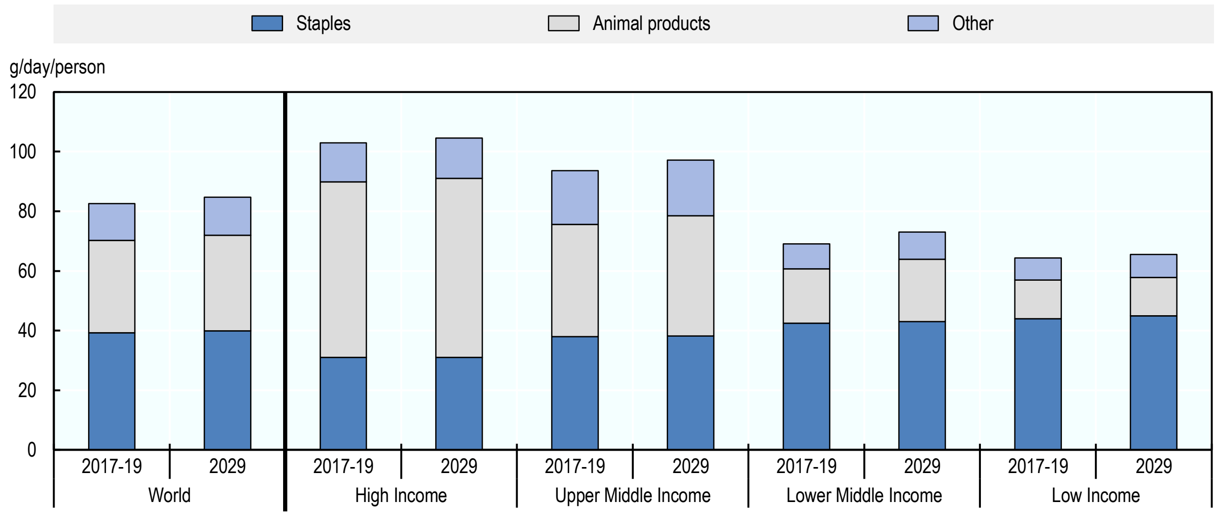
Food proteins play a vital role in food security and nutrition. They are essential in growing, maintaining and providing structure to tissues; they serve to form antibodies and perform essential functions in the human metabolism; and serve as a source of energy. While plant sources such as pulses, and cereals such as wheat, can provide a significant part of the overall protein requirements, essential amino acids are found mostly in proteins from animal sources.

Due to globally rising per capita incomes and declining real food prices, the demand for animal products has risen over the last decade. This increase has also been sustained by urbanisation, which facilitates large-scale meat and dairy processing. Moreover, the retail sector has invested in improving cold chains, allowing perishable food, including animal products, to travel longer distances at lower costs from producers to consumers, preserving its nutrients and organoleptic features. In line with these past developments, total per capita availability of protein is expected to rise at the global level to 85 g per day in 2029, from 83 g per day in the base period. Income-related differences in the composition of protein sources will persist, with lower middle- and low-income countries expected to remain heavily dependent on proteins from crop sources, given lower average household incomes and a lower availability of protein from animal sources due to the lack of adequate supply chains to trade and preserve fresh meat (Figure 1.8). Protein from animal sources, meanwhile, will continue to account for the bulk of protein consumption in the high-income regions of North America, and Europe and Central Asia.

Figure 1.8. Per capita consumption of main food groups (protein equivalent), by income group



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000. Staples includes cereals roots and pulses. Animal products include meat, dairy products (excluding butter), eggs and fish. The category others include fruits, vegetables, etc.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Overall, protein from animal sources are expected to account for a greater share of total daily per capita availability. Growth in animal protein consumption will be particularly pronounced in upper middle- and lower middle-income countries, where daily per capita meat and fish availability is expected to rise by 8% and 16%, respectively. Income-driven growth in demand for meat and fish in China, which is expected to see an 11% increase in daily per capita availability, will be the main contributor to the upper middle-income country group. Although consumers in lower middle-income countries increase their consumption of animal protein faster than consumers in any other income group, their per capita intake remains significantly below consumption levels in upper middle- and high-income groups. India's traditionally low consumption of animal protein, especially meat, considerably influences the lower-middle income group trend.

Consumers' growing environmental and health-consciousness, on the other hand, is expected to support a transition from animal-based protein towards alternative sources of protein (e.g. plant-based and insect protein), as well as the more immediate substitution away from red meat, notably beef, mainly towards poultry and fish, which consumers perceive as healthier alternatives. These shifts will be particularly pronounced in high-income countries. Demand for poultry in lower-income countries, meanwhile, will be driven by the affordability of poultry against other meat types, its presumed superior health attributes and its broad cultural acceptability.

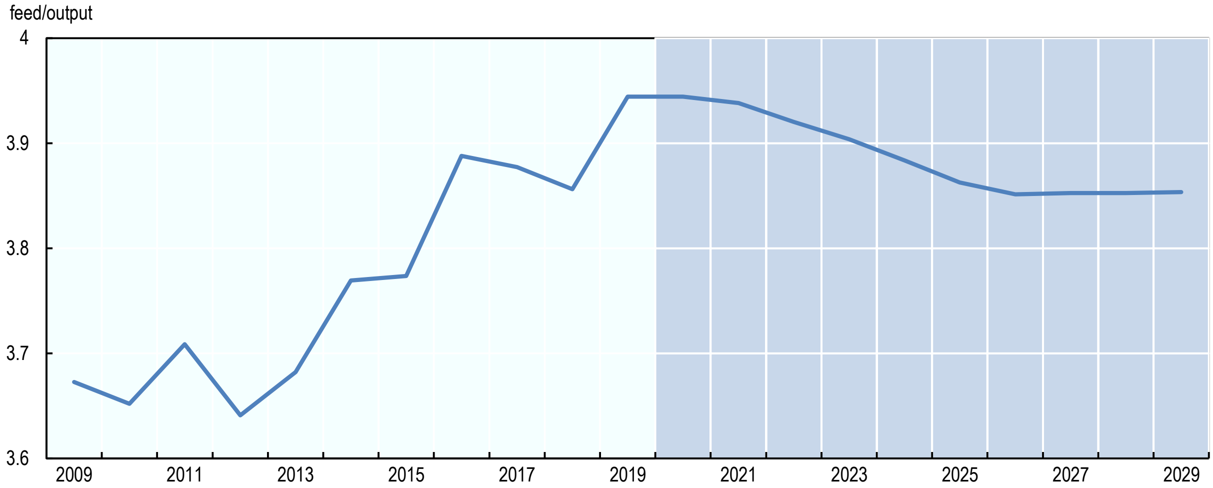
Increasing demand for livestock products and fish will increase feed use

The ongoing evolution of global nutrition patterns towards a higher share of foods from animal origin results in a larger amount of crops and other agricultural and fish products being used as feed. Currently, about 1.7 bln t of cereals, protein meals and various processing by-products (e.g. dried distillers grain, cereal bran) are used as feed. By 2029, this amount is expected to reach almost 2 bln t. This growth is mainly due to the continuing expansion of the livestock herd and aquaculture production in low- and middle-income countries. The *Outlook* also assumes a further intensification of livestock and fish production, whereby more feed per unit of output is used, mostly in order to accelerate the finishing process thus providing a higher return on fixed capital investments. Therefore, advanced economies with capital intensive production technologies typically use feed intensively. They also tend to use the most advanced animal and fish breeds, which provide the most efficient feed conversion rates. Therefore, two offsetting trends in feed demand are expected over the coming decade: intensification and efficiency gains. The *Outlook* assumptions on technology project that after a period of global feed use intensification since 2010, which outweighed the shift of global production to more feed-efficient poultry production, the ongoing commercialisation of the livestock sector in emerging economies will result in further feed use intensification, which, however, will be offset by efficiency gains through investments into genetics, feed technology and herd management that will be achieved in more advanced operations over the coming decade (Figure 1.9)

Commercially raised livestock is mainly fed on compound feed rations to produce high value proteins in the form of meat, fish, eggs and milk. This process uses a wide variety of concentrate feeds that have a high energy and protein concentration. However, only part of this energy and protein is recovered as human food in the form of livestock and fish products (Figure 1.10). The larger part is consumed by the so-called "maintenance ration" which is just sufficient to meet the requirements of the animal to maintain its life. An animal receiving only this ration will neither lose nor gain weight. The rate of conversion of feed into the desired animal products depends on the type of animal, breed and production technology, and on the type of feed. Both the total use of feed energy and protein will grow by about 15% over the coming decade, and despite the ongoing innovation in the livestock sector the share of feed energy that is converted into human food is expected to stay globally at about 23%. The bulk of energy is still spent to maintain the animal and cannot be harvested.

The baseline projections also point to a globally fixed relationship between animal food production and the necessary protein feed over the coming decade. The share of recoverable feed protein is slightly higher (27%) than calculated for the energy component. Non-ruminant animals need plant protein as they do not have ruminant's ability to convert grass and other non-protein feed into meat and milk. However, the protein in meat, fish, eggs and milk is considered of higher value for human nutrition compared to the protein in soybean meal or wheat.

Figure 1.9. Feed to production ratio



Note: This ratio includes only feed prepared from cereals, oilseeds and a number of by-products, it therefore slightly overestimates the feed efficiency of the livestock and aquaculture sector. Pasture-based cattle and sheep convert feed that cannot be accessed directly by humans into meat and milk. Similarly, pigs and poultry are still being raised on organic residues in non-commercial operations. Simple forms of aquaculture rely solely on naturally available feed. Because the nutritional value of these feed sources is difficult to quantify, it is excluded from the above calculation.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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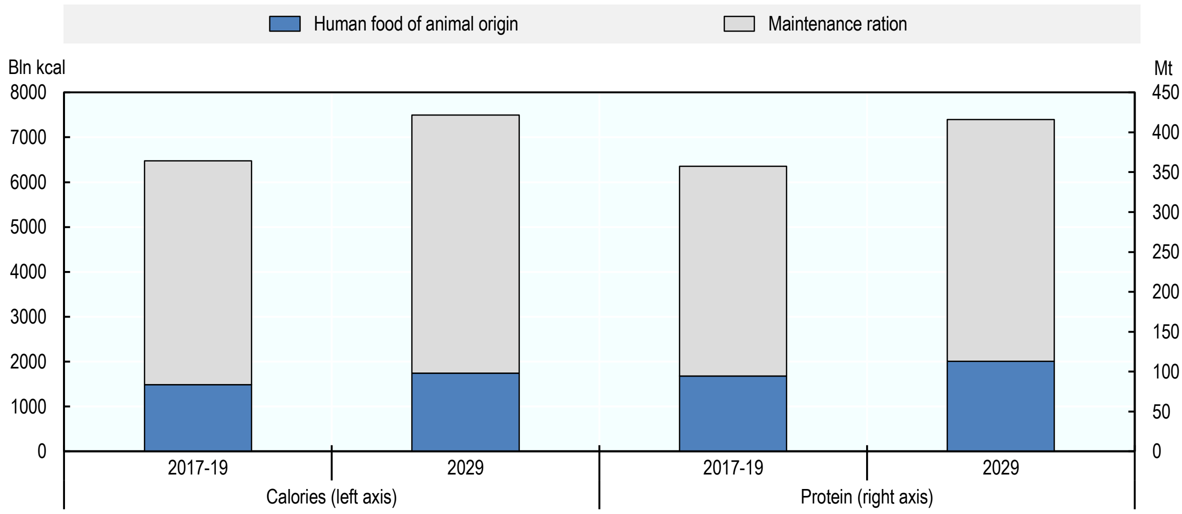
Figure 1.10. Global feed energy and protein use



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Structure of feed demand

There are many different types of animal feed that are customarily classified according to their protein content. High-protein feeds are mainly meals derived from oilseeds, dried distiller grains are a typical medium-protein feed, while cereals are classified as low-protein feeds. Figure 1.11 shows the use of compound feed in non-ruminant production and the composition of feed rations by energy and protein content. Feed intensity and respective shares of high-, medium-, and low-protein feeds vary significantly between high-, middle-, and low-income countries because of their differences in production technology.

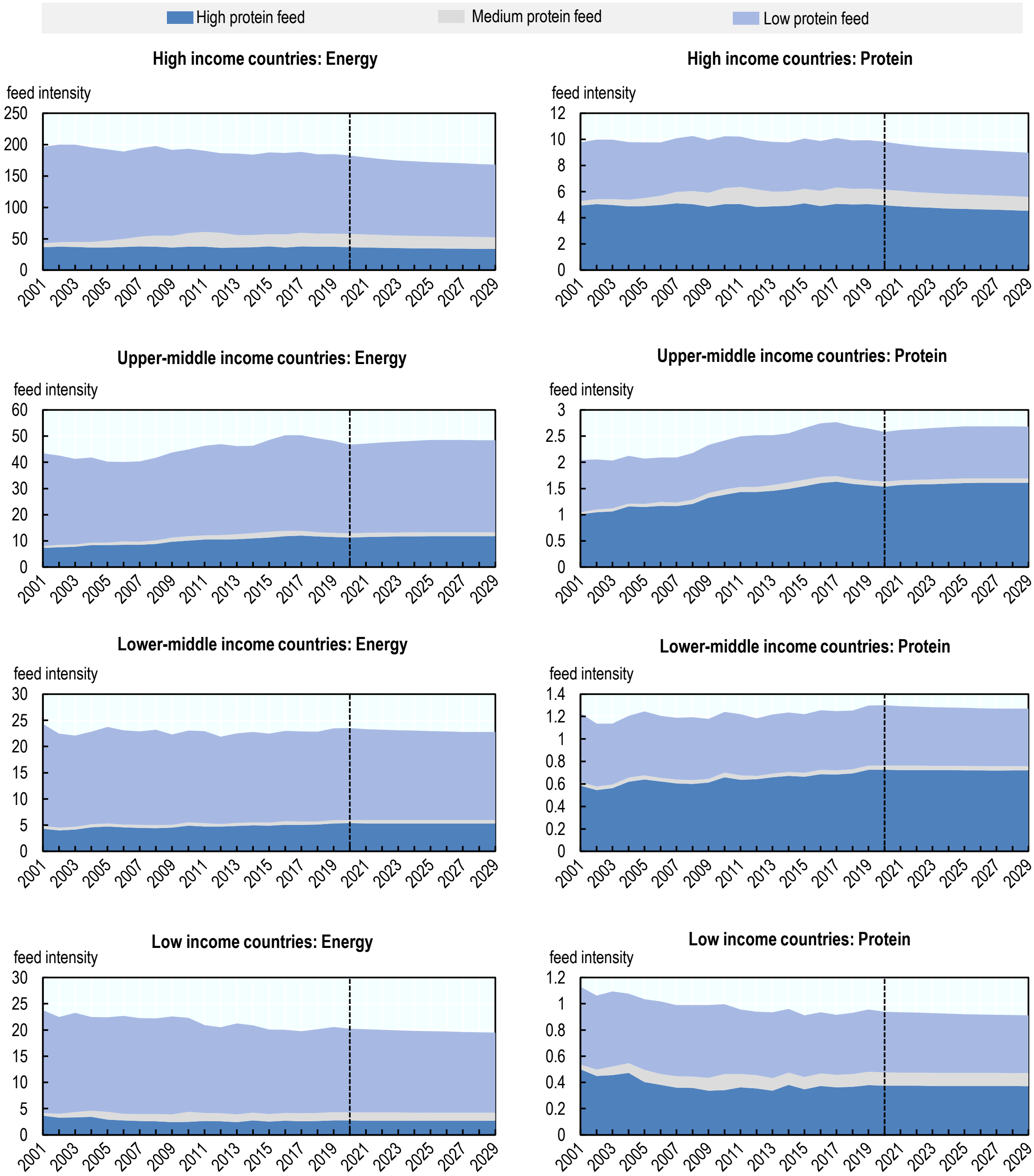
The group of high-income countries is expected to improve the feed conversion for both energy and protein feed further through breeding and herd management advances, without changing the ration composition. These ongoing reductions are possible as a result of breeding progress and other technological advances within a highly feed intensive technology compared to less developed countries.

Upper middle-income countries currently use much less feed per unit of non-ruminant output. The pork, poultry and egg sectors in these countries are expected to intensify their technology as their operations are becoming more commercialised. Feed rations are expected to incorporate slightly more high protein feed over time.

Farmers in lower-middle income countries are expected to maintain their level of feed use per unit of output of non-ruminant livestock production. The composition of rations is not expected to change significantly, only a very slight increase in the share of high-protein feed is projected. The predominantly smallholder and small family farmers in these countries are not expected to significantly intensify the technology of their operations.

Animal husbandry in low income countries is expected to remain largely dependent on small-scale producers, who are using mostly locally sourced feed. Poultry operations tend to be the most commercialised and are projected to expand the fastest. The projected reduction in feed use per unit output is due to the growing share of poultry in total non-ruminant production. The intensification of production technology is constrained by a lack of investment capital stemming mostly from the small-scale structure of the sector, underdeveloped financial markets and value chains in the agriculture of these countries.

Figure 1.11. Structure of feed use, by income group



Note: Feed intensity indicates the amount of feed energy per unit of non-ruminant animal product production. Feed intensity indicates the amount of feed protein per unit of non-ruminant animal product production.

The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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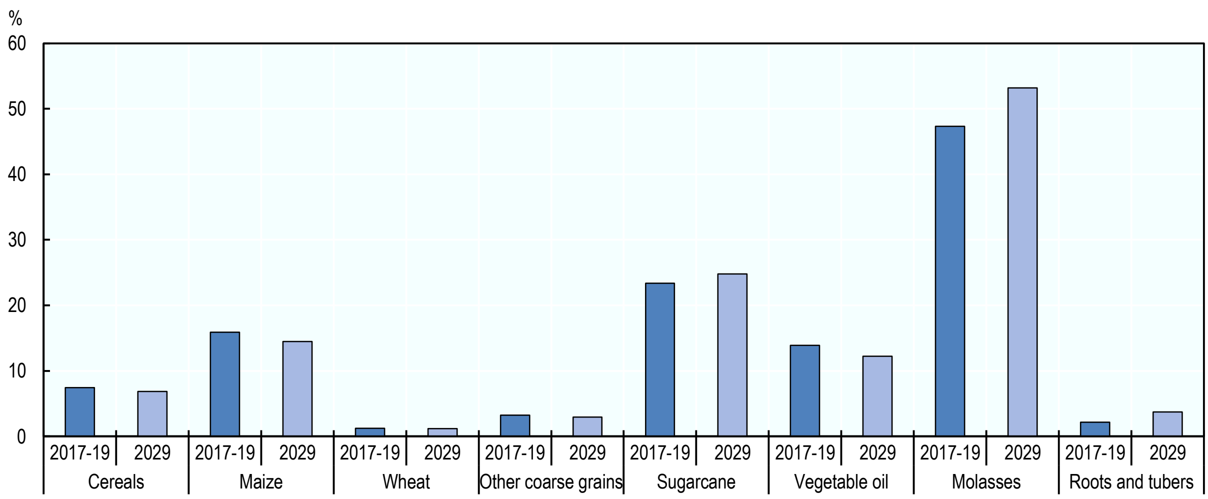
Limited growth in biofuels demand

Over the past decades, demand for biofuels has increased significantly following the implementation of policies with three main objectives: (i) support countries' commitments to reduce their carbon dioxide (CO_2) emissions, (ii) reduce the dependency on imported fossil fuels and (iii) create additional demand for feedstock crops to support domestic producers.

While these drivers are assumed to persist over the coming decade, biofuels are not expected to generate a lot of additional demand for feedstock crops. Biofuels are not expected to receive the same kind of political support as in the past, due to the growing proliferation of electric and hybrid vehicles, which offer better efficiency in the reduction of greenhouse gas (GHG) emissions. Additionally, the use of gasoline-type transportation fuel in two of the main ethanol markets, the United-States and the European Union, is projected to decline over the next decade. This decline is only partly compensated by an increase in the blend rate in the United-States, resulting in a slower growth in demand for maize as the main feedstock. Globally, biofuel use of maize is expected to expand only slightly over the coming decade, thus reducing its share of total use from 16% in the base period to about 14% in 2029 (Figure 1.12).

Figure 1.12. Share of biofuel in total use



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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By contrast, biofuel is expected to increase its share in global sugarcane use to about 25% in 2029 from 23% in the base period. This gain can be largely attributed to the projected expansion of the Brazilian RenovaBio program, which aims to reduce GHG emissions from transportation fuel by 2028. In Brazil, fuel ethanol is consumed either blended with gasoline or as pure anhydrous ethanol fuel, which significantly increases the ethanol share of total transportation fuel compared to countries that mainly use low blends. The higher blends of ethanol are supported by lower taxes, making ethanol more competitive than fossil fuel. These policies will continue to help Brazil to meet its GHG emissions reduction commitments, to decrease its dependency on imported gasoline, and to support the country's sugar cane sector, which provides 1.15 million direct jobs. In other Latin American countries, such as Colombia, Paraguay and Peru, the sugar cane sector is similarly labour intensive and provides a significant share of farmers' income in rural areas. In order to protect these jobs, governments will support the biofuel demand for sugar cane by restricting ethanol imports in combination with mandatory fuel blending.

Asian countries barely use sugar cane for ethanol production, in part because increasing its use would require additional land, which could negatively affect the production of cereals for food consumption and thereby threaten food security. Given those constraints, sugarcane molasses, a by-product of refining sugar, is one of the main feedstock in ethanol production. Over the outlook period, the share of molasses used for biofuel is expected to increase from 49% in the base period to 54% in 2029. Biofuel demand is projected to increase its share of global roots and tubers demand from 2% in the base period to about 4% in 2029, with China accounting for most of the increase.

While the use of vegetable oil as biofuel is expected to remain constant at about 30 Mt, its share in global vegetable oil use is expected to decline from about 14% in the base period to about 12% in 2029. In addition to the expected decline in biofuel-blended diesel fuel use in the European Union, a new regulatory framework limits the use of feedstock (mostly palm oil) grown in carbon-capturing ecosystems such as forests, wetlands and peatlands. However, increasing demand for palm oil-based biodiesel, mainly in South East Asian countries will compensate the reduction in the European Union. Indonesia and Thailand are expected to continue to support the use of domestically produced palm oil in the production of biodiesel. Indonesia, for instance, employs a variable levy system to ensure the domestic supply of feedstock to the local biofuel industry by taxing palm oil exports.

Other uses

Apart from food, feed and biofuel use, the agricultural commodities covered in the *Outlook* are used for a broad range of additional purposes. The *Outlook* combines seed use, postharvest losses, waste and all industrial applications, except biofuel, into the summary category “other uses”. The industrial applications include the use of cereals for the production of industrial starch, spirituous liquors, and for the paper, textile and pharmaceutical industries. Maize in particular has an increasing importance in the production of bioplastic for food packaging, bottles, kitchen utensils, straws, etc. Rice is projected to have a growing importance in the cosmetics industry. Face washes, liquid shower soaps and hair products, especially in Asian countries, are going to contain more rice ingredients. Molasses, a by-product of beet or cane sugar production, is used in the production of products like yeast, vinegar, citric acid, vitamins, amino and lactic acid. Vegetable oils are used as ingredients in cosmetics and personal care products, lipid-based excipients in pharmaceutical products, pet feed additive, etc. The role of plant-based ingredients is increasingly important in cosmetics which will likely result in a growing demand for vegetable oil, mainly olive oil, for cosmetic products. Cotton is mainly grown for its fibrous content (cotton lint), which is spun into yarn that is subsequently used for the production of garments and other textile products.

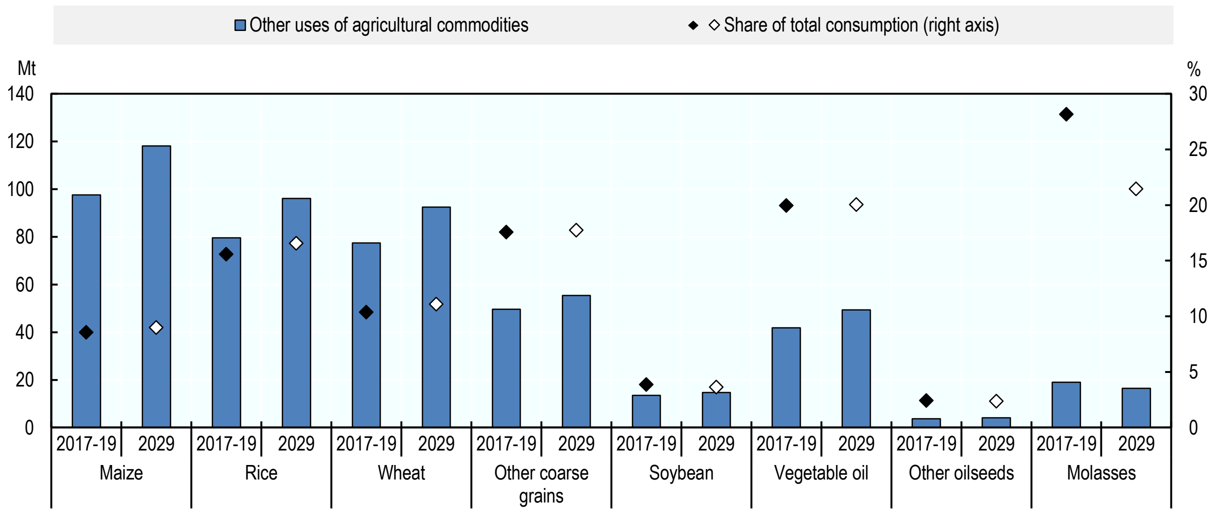
Other use of maize will increase by about 20% over the projections period, which is slightly faster than the projected overall consumption growth, thereby increasing the other use share from currently 8.5% to 9% in 2029. The share of other use of wheat and rice is also expected to slightly expand over the coming decade, indicating a heightened demand for renewable raw products (Figure 1.13).

The use of molasses as an industrial raw product is expected to decrease significantly as its biofuel feedstock use is expanding further during the projection period. The share will drop from nearly 30% in the base period to about 20% in 2029.

The other use shares of the remaining commodities, oilseeds, including vegetable oil and other coarse grains, are expected to remain at current levels during the outlook period. No structural changes in their consumption profile are foreseen, the industrial applications, the seed use and waste will follow the overall consumption patterns.

Global consumption of lint cotton will grow at a slightly higher rate than global population in the coming decade. Ongoing income growth should lead to a higher demand for cotton products. The geographical distribution of demand depends on the future location of spinning mills. China has been the world’s largest consumer of raw cotton since the 1960s. However, major shifts are taking place, with yarn production gradually moving from China to other Asian countries, mainly Bangladesh and Viet Nam. Growth in raw cotton processing is also expected in India, Turkey and Central Asia.

Figure 1.13. Other use in absolute value and as share of total consumption



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.3. Production

The *OECD-FAO Agricultural Outlook* projects future trends in production of the main livestock (meat, dairy, eggs and fish) and crop commodities (cereals, oilseeds, roots and tuber, pulses, sugar cane and sugar beet, palm oil and cotton) to be used for human consumption, as animal feed or as biofuel feedstock. The *Outlook* projections break down agricultural output growth into its main determinants; namely growth in crop yields, area harvested intensification, cropland expansion, growth in output per animal and herd expansion. This reveals how the production responses to meet growing demand for agricultural commodities, varies across different sectors and regions.

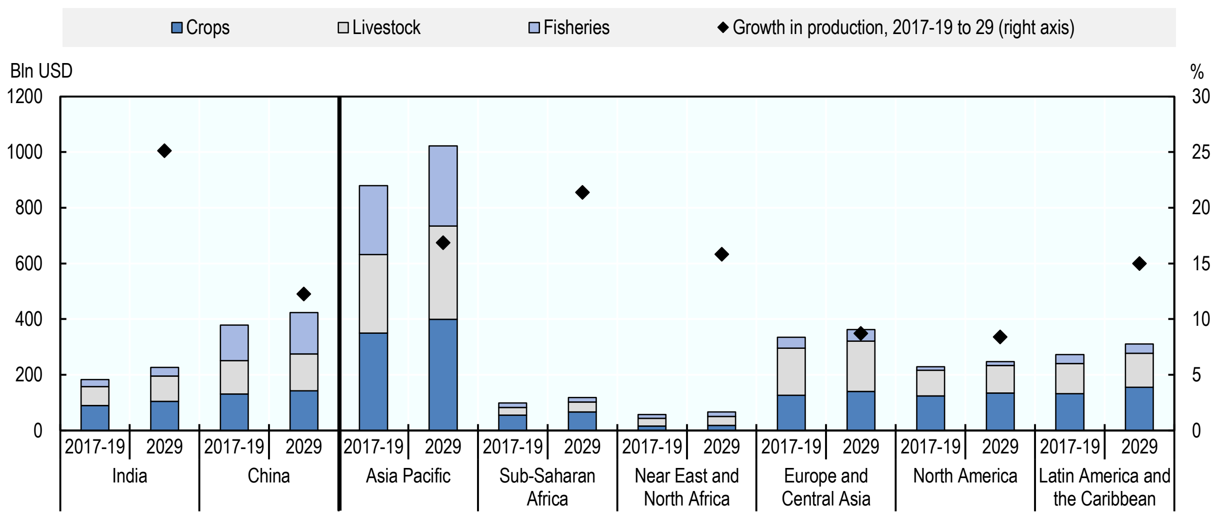
Global agricultural production is projected to increase over the coming decade, in response to growing demand, albeit at a slower rate than observed over the previous decades (Figure 1.13). Most of the growth in production is projected to occur through productivity improvements, due to intensification and ongoing technological change leading to a further decline in real commodity prices, despite increasing constraints on expanding agricultural land in some regions.

For crops in particular, yield improvements are projected to account for almost all of the additional output, with only a small expansion of cropland area being required at the global level. However, the relative importance of increased productivity (i.e. higher yields and cropping intensity) and cropland expansion will vary between world regions and commodities, reflecting differences in availability and cost of land and other resources. Productivity gains will come from more intensive use of agronomic inputs (fertiliser, pesticides, and irrigation), which can lower land use requirements, as well as through technical changes (e.g. improved crop varieties) and technical efficiency improvements (e.g. better cultivation practices) that reduce the inputs required per unit of output.

Global growth in livestock output will rely on a combination of yield improvements (i.e. higher output per animal) and an expansion of the production base (i.e. more animals). As with the crop sector, a combination of intensification (e.g. increasing use of high energy and high protein feed), technical changes (e.g. ongoing progress in breeding), and technical efficiency improvements (e.g. disease control and improved management practices), will support productivity growth at the global level. Increase in animal numbers will also play a significant role, especially in low income and emerging countries, which are expected to account for the majority of output growth over the next decade.

The agriculture sector is not only under pressure to increase production in line with growing demand but also to do so sustainably. While the intensification of agricultural production has enabled the sector to feed a growing population and limit increases in agricultural land use, some intensification practices, however, have also exacerbated environmental problems and threatened sustainability. The Agriculture Forestry and Land Use (AFOLU) sector is one of the main contributors to climate change; accounting for a fifth of global GHG emissions. It thus has a key role to play in mitigating global GHG emissions, and meeting the Paris Agreement's target of limiting global temperature increases to well below 2°C. Agriculture is also one of the most exposed sectors to climate change, which will harm crop and animal productivity in most regions, particularly if no adaptation measures are implemented, and will also lead to a relocation of agricultural production. This could give rise to more volatile food supplies and prices over the coming decades.

Figure 1.14. Regional trends in agriculture and fish production



Note: Figure shows the estimated net value of production of agricultural and fish commodities covered in the *Outlook*, in billions of USD, measured at constant 2004-6 prices.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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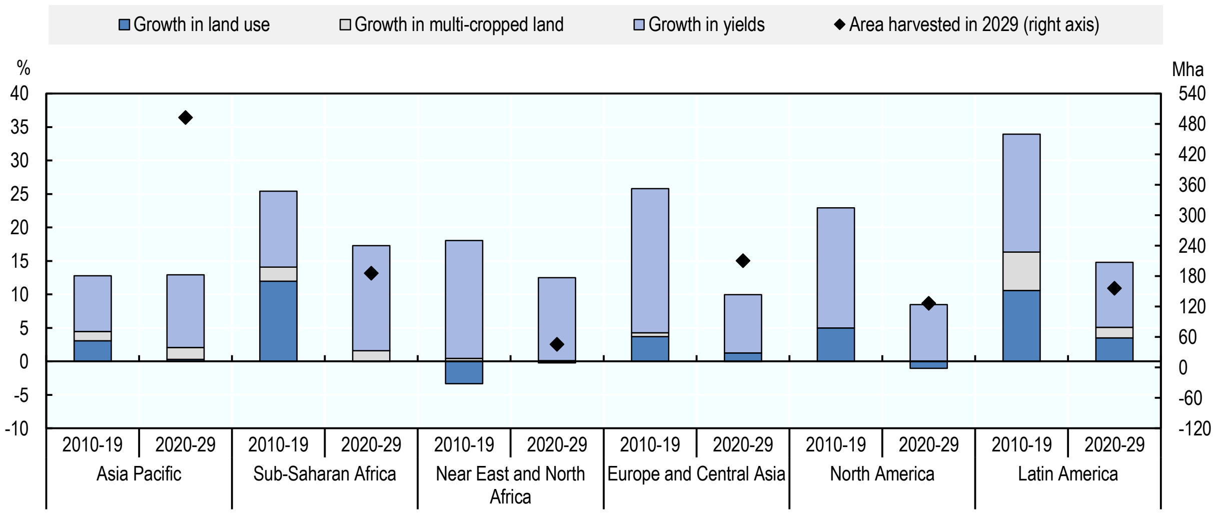
Currently, the Asia Pacific region contributes most to global agricultural production, accounting for almost half of global output. Europe and Central Asia and the Americas are responsible for another 45% (Figure 1.14). Over the coming decade, crop, livestock and fish production are expected to grow most strongly in Asia Pacific (17%) – mainly driven by strong output growth in India (25%) – and in Latin America (15%). Production growth will be more muted in Europe and Central Asia, and in North America as agricultural productivity is already at high levels, and policies constraints (e.g. environmental and animal welfare policies) will limit further output growth. Sub-Saharan Africa and Near East and North Africa, on the other hand, currently account for a small share of global output of basic agricultural commodities. However, from their small production base and low productivity levels, strong production growth is projected in these two regions over the next ten years (21% and 16%, respectively). The significant output growth in emerging and low-income regions reflects greater investment and technological catch-up, as well as resource availability. Producers in these regions also respond to higher expected returns due to export opportunities (e.g. in Latin America) or comparative advantages in satisfying a growing domestic demand induced by population and income growth (e.g. in Sub-Saharan Africa and India). Such opportunities might be particularly important for fruits and vegetables (see Chapter 11 “Other Products”).

Productivity improvements drive crop production growth

Main drivers of global crop production growth

Over the coming decade, most production growth is expected to come from increased productivity (i.e. higher yields and cropping intensities) with only limited expansion of agricultural land at the global level. The *Outlook* projects global crop production to increase by almost 15% by 2029 (582 Mt), with cereals output projected to expand by 375 Mt, 80 Mt for oilseeds, 42 Mt for roots and tubers, 16 Mt or pulses and 3.5 Mt for cotton. Cropland expansion, on the other hand, is expected to be limited at the global level (1.3%). Globally, crop output is expected to increase more slowly than over the last decade, as yield growth starts from a higher base and less land will be brought into production (Figure 1.15).

Figure 1.15. Global growth in crop production



Note: Figure shows the decomposition of total production growth (2010-19 and 2020-29) into growth in land use, land intensification through growth in multi-cropped land, and growth in yields. It covers the following crops: cotton, maize, other coarse grains, other oilseeds, pulses, rice, roots and tubers, soybean, sugarbeet, sugarcane, wheat and palm oil.
Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Low income and emerging regions with greater availability of land and labour resources are expected to experience the strongest growth in crop production over the next ten years, accounting for about 50% of global output growth. National food self-sufficiency policies will also support this expansion, and in particular for cereals. In Asia Pacific only, crop output is projected to grow at the same rate than over the last ten years (13% or 248 Mt), mainly on the account of strong production growth in India. High crop output growth is also projected in Latin America (15% or 115 Mt), and in Sub-Saharan Africa (17%), albeit from a lower production base, adding 62 Mt. Europe and Central Asia and North America will continue to significantly contribute to global crop production, maintaining their share of global output by 2029, at 19% and 17%, respectively. However, production growth in these regions will be more limited; despite strong output growth in Eastern Europe.

Yield growth is expected to be responsible for 88% of global crop output growth over the next ten years. In the high yielding regions of North America and Europe and Central Asia, yields will grow at a slower rate than over the last decade as they are already at high level for most crops. In these regions, further yield growth will be mainly achieved through the adoption of advanced technologies (e.g. plant breeding) and the implementation of better cultivation pratices. Yields will grow strongly in Sub-Saharan Africa (16%) and in Near East and North Africa (12%), reflecting the important production potential of these regions, increasing use of agronomic inputs and the implementation of better farm management practices, but also the relatively low yields experienced so far. These higher growth rates will thus translate into a lower absolute increase in yields for several crops.

Harvested area intensification will also contribute to global crop production growth, especially in Latin America, Sub-Saharan Africa, and Asia Pacific where it is projected to account for 10% to 15% of total output growth. Overall, area harvested of the main crops reflected in the *Outlook* is projected to expand by 19.6 Mha between 2020 and 2029, with 30% of this occurring in Brazil and Argentina. In these two countries, the expanding practice of double cropping of maize/wheat and soybean is expected to raise output through more intensive use of already cultivated land. Double cropping also plays an increasing role in other regions and for other crops, in particular for rice.

Cropland area expansion, on the other hand, is projected to account for only 5% of global crop production growth and will play a much smaller role than over the last decade, in all regions. In Sub-Saharan Africa, for instance, growth in land use accounted for about half of total crop production growth over the last decade. Over the outlook period, output growth is expected to be achieved without expansion of the cropland area due to productivity improvements (i.e. higher yields and cropping intensities), and investors focus on acquiring and consolidating existing farm land into larger units rather than investing into the expensive clearing of additional land, as it was the case in the past. Growth in land use will only be a substantial contributor to crop production growth in Latin America, where it is expected to account for 25% of total output growth, reflecting greater land availability and lower costs associated with land expansion in the region (Section 1.3).

Crop yield variations

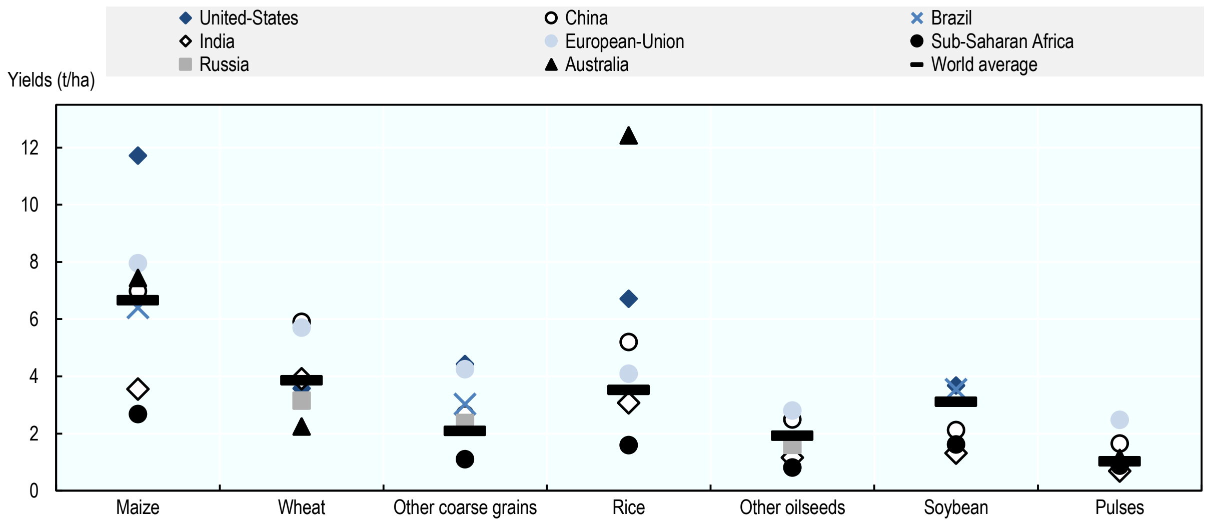
Despite the significant growth in yields projected in emerging and low-income regions over the coming decade, large disparities in yield levels between countries and regions are expected to remain. This is partly due to differences in agro-ecological conditions but it also reflects differences in access to agronomic inputs including fertiliser and improved crop varieties as well as differences in access to technologies and human capital. Inter-regional variation in yields also tend to differ widely between crop types (Figure 1.16).

Maize yields in 2029 are projected to range between 2.7 t/ha in Sub-Saharan Africa and almost 12 t/ha in the United-States, the largest maize producer and exporter in the world. In the later, intensive input use together with ongoing progress in plant breeding will enable further yields growth over the coming decade. Similarly, average rice yield in Australia is expected to reach 12.4 t/ha in 2029, due to intensive use of agronomic inputs (fertiliser, pesticide, irrigation) and the implementation of good cultivation practices on the most suitable lands. This is almost eight times higher than the projected average rice yield in Sub-Saharan Africa (1.6 t/ha), where fertilizer availability and quality are limited and application rates are the lowest among all regions. Average yields are also influenced by harvest failures caused by drought or locust plagues, which are frequent in Sub-Saharan Africa. Overall, these trends in cereal yields highlight the need for increased technology transfer across world regions in order to further reduce yield gaps. Nevertheless, sustained growth in cereal yields in all regions will enable most of global output growth to be achieved without an expansion in the cropland area.

For oilseeds and traditional crops such as pulses, yield gaps are more limited. In 2029, pulses yields in the European Union, one of the highest yielding regions, are expected to be only three times higher than pulses yields in India, the world largest producer. For oilseeds and pulses, growth in global production is expected to come in part from greater land use as yield growth will be more limited over the coming decade. Area expansion will also remain important for other crops such as cotton (not represented in Figure 1.16) as yield improvement in key producing countries (e.g. India) are expected to be insufficient to meet global demand growth.

Overall, the strongest yield growth in low income and emerging regions will translate into relatively small absolute increases in yields, given their low base levels. By 2029, average crop yields in both India and Sub-Saharan Africa, for instance, are projected to remain well below yield levels in all high yielding countries, including countries/regions with comparable natural conditions (e.g. South East Asia, Latin America). This indicates that many countries will still be far from their yields potential and therefore from their potential output by the end of the outlook period.

Figure 1.16. Projected crop yields for selected countries and regions in 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Potential for sustainable intensification

Given appropriate incentives, further intensification in crop production will occur to meet growing demand for crop commodities, especially in regions that have not reached their potential yields and output. Output growth through the intensification of crop production (i.e. higher output per unit of land) is assumed to be more economically efficient than through large expansion of agricultural land given the prevailing policy and economic conditions. More intensive use of agronomic inputs, in particular, has made it possible to feed a growing population with relatively small increase in agricultural land use. However, the intensification of agricultural practices (e.g. drainage, tillage), and in particular the more intensive use of fertilisers and pesticides, can exacerbate some environmental problems and threaten sustainability (Section 1.3). In most world regions, there is scope for efficiency gains through the adoption of more advanced technologies (e.g. precision farming) or the implementation of better management practices, which would allow to produce a greater output without an increase, or with less than proportional increase, in inputs use, including natural resources and chemical inputs.

In addition to conventional, high input systems, alternative crop production systems have emerged. By reducing or eliminating the use of chemical inputs or shorting supply chains, some of these approaches aim to reduce the environmental footprint of commercial agriculture. Organic agriculture, for instance, achieves better environmental impact per unit of land used, although it produces less food per unit of agricultural land. Studies have showed that organic yields are at least 20% lower than yields in conventional agriculture, which implies that it requires much more land to produce the same output (De Ponti, Rijk and Van Ittersum, 2012[1]). This raises a number of concerns given the limited availability of land suitable for agriculture, and the negative environmental impacts associated with agricultural land expansion (Section 1.3).

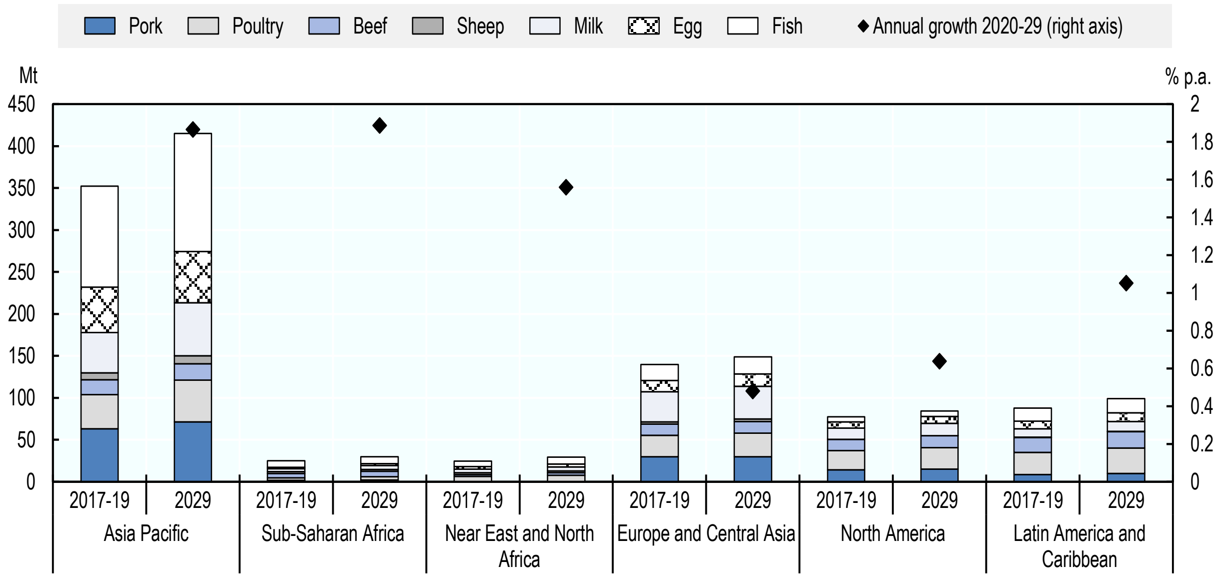
Organic agriculture is rising globally. It already accounts for 7.5% of total agricultural area in the European Union for instance, with this share being higher than 20% in some Members States (e.g. Austria, Estonia, Sweden) (Eurostat, 2020[2]). Over the coming decade, the share of organic area in the European Union could be sufficiently high to influence average fertiliser use by hectare, and potentially average crop yields. Crop production in other main producing regions, however, should continue to mostly rely on conventional high-input systems.

Intensity of livestock production varies by type of product and by world region

Location of global production growth

The Asia Pacific region currently accounts for half of global livestock production. Europe and Central Asia, and the Americas are responsible for another 20% and 23%, and these shares are expected to remain stable by the end of the outlook period. A few countries, in particular (i.e. China, India, Brazil and the United-States), and the European Union, will continue to dominate livestock production globally. Over the outlook period, global livestock production (i.e. meat, milk, egg and fish) is expected to expand by 14% (99 Mt), supported by lower feed prices and stable product prices ensuring remunerative profit margins to producers (Figure 1.17).

Figure 1.17. Global livestock production



Note: Milk production is expressed in Mt of milk solids.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Globally, meat production is projected to expand by 12%, supported by favourable meat-to-feed price ratios. Most of the growth in meat output will originate from emerging and low-income countries (Brazil, China, India, Mexico, Pakistan, and Turkey in particular).

Poultry is expected to be the fastest growing meat, with a projected increase in production of 16% (20 Mt). This accounts for about half of the projected increase in total meat output. Rising poultry production in Asia Pacific and Latin America, in particular, is expected to account for 60% of the global increase in poultry meat. This growth in output will be encouraged by low production costs, a short production cycle, high feed conversion ratios and growing consumer demand in most world regions, which will keep prices stable.

Sheep meat production is significantly lower than the production of other meat types at the global level, but it is also expected to grow strongly over the next ten years. The projected increase of 14% or 2 Mt in sheep meat output will mainly be supported by strong demand growth in China and Africa, most of which will be sourced locally. More limited output growth is projected in Oceania (6%), due to the ongoing competition for pastureland from beef and dairy in New Zealand, and the prolonged drought condition in Australia, which has resulted in a decrease in sheep flocks.

Globally, beef production is projected to expand by about 9% over the outlook period. Most of this increase will originate from Asia Pacific (2 Mt), China and Pakistan, in particular, and from Latin America (1.5 Mt), together accounting for more than half of global output growth. Beef production will also expand in North America (0.8 Mt) supported by low feed costs and positive price expectation due to sustained domestic demand. In the European Union, however, the low profitability of the beef sector, which can partly be explained by declining domestic demand, together with large efficiency gains in the dairy sector have led to a reduction in the cowherd in recent years. This is expected to result in a decrease of 6% (-0.4 Mt) in the beef output over the next ten years.

Pigmeat production is projected to grow by 11 Mt by 2029 (9%). This expansion will be largely concentrated in China, which is expected account for nearly 60% of global output growth over the coming decade (6.5 Mt). While the African Swine Fever outbreak is projected to continue to negatively impact pork production in China and in other countries in East and South-East Asia in the first years of the projection period, pigmeat output is expected to gradually recover by 2025. In the European Union environmental restrictions are expected to cause pigmeat production to fall by 2% (-0.5Mt) over the outlook period.

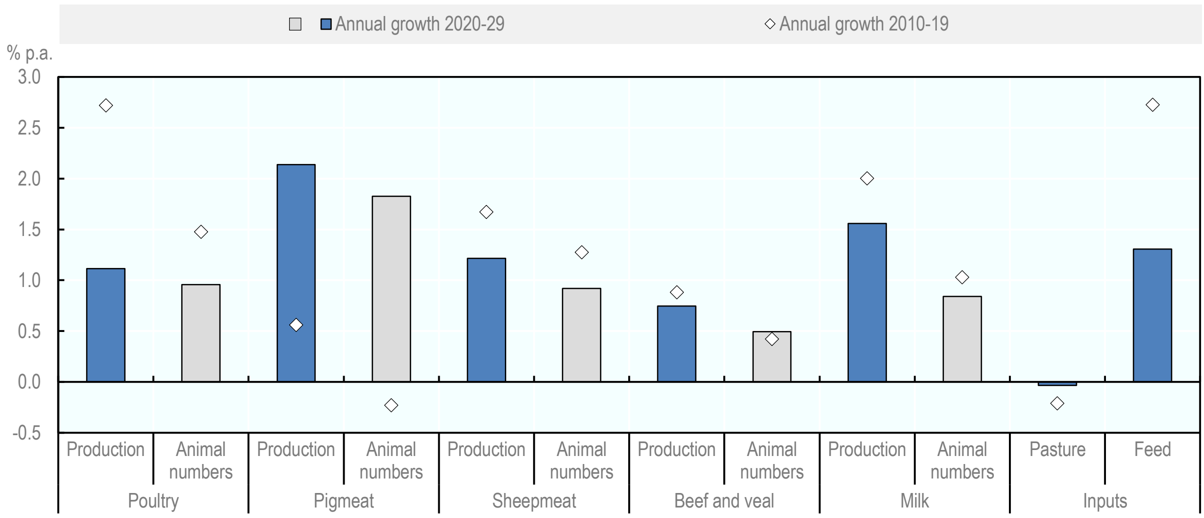
Among all livestock commodities, dairy is expected to experience the strongest growth over the next decade in response to strong demand. Milk production is projected to increase by 20%, with India and Pakistan accounting for 60% of global output growth. The sector is responding to low production costs and high prices expectations. Milk prices are supported by strong demand, especially for fresh dairy products in Asian countries (India, Pakistan). In Africa, strong population growth and the introduction of cooling systems are also expected to result in growing demand for dairy products. Globally, egg production is projected to increase by 13%; China and India accounting for 45% of the global increase.

Main drivers of global production growth

The global expansion in livestock production will rely on a combination of two main growth factors (Figure 1.18). First, improvements in genetics and animal health together with better management and feeding practices will enable higher livestock production intensity (i.e. higher output per animal per year) in all regions. More intensive meat production will occur through higher slaughter weight per animal and shortening the time to finish an animal for slaughter. In addition to further intensification, output growth will also be supported by an increase in animal numbers. The relative importance of these two growth factors will vary by type of livestock commodity, and by world region.

Globally, poultry output and animal numbers are projected to grow in step over the coming decade (1% p.a.) (Figure 1.18). In some important producing regions such as North America and the European Union, where productivity per animal is already high, further intensification options will be limited. However, greater feed efficiency is expected to be achieved, thus reducing production costs and pressure from feed availability. In emerging and low-income countries, however, there is still significant scope for intensification in the poultry sector. For instance, the modernisation of the poultry supply chain which has occurred in a several countries in Sub-Saharan Africa (e.g. South Africa, Tanzania) is expected to continue and lead to strong output growth over the coming decade (2.4% p.a.).

Figure 1.18. Growth in global livestock production



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Sheep meat production and animal numbers are also projected to grow in line over the next ten years, as sheep in most part of the world are farmed extensively in pastoral production systems. Strong output growth in Sub-Saharan Africa (2.3% p.a.), in particular, will be supported by a large increase in animal stocks, as breeding progress has so far been limited in the region. Overall, intensification in Africa is still constrained by structural issues such as lack of investment capital, the limited availability of feed and environmental factors such as desertification or locust plagues. These factors are particularly pronounced for ruminants production (cattle, sheep and goats).

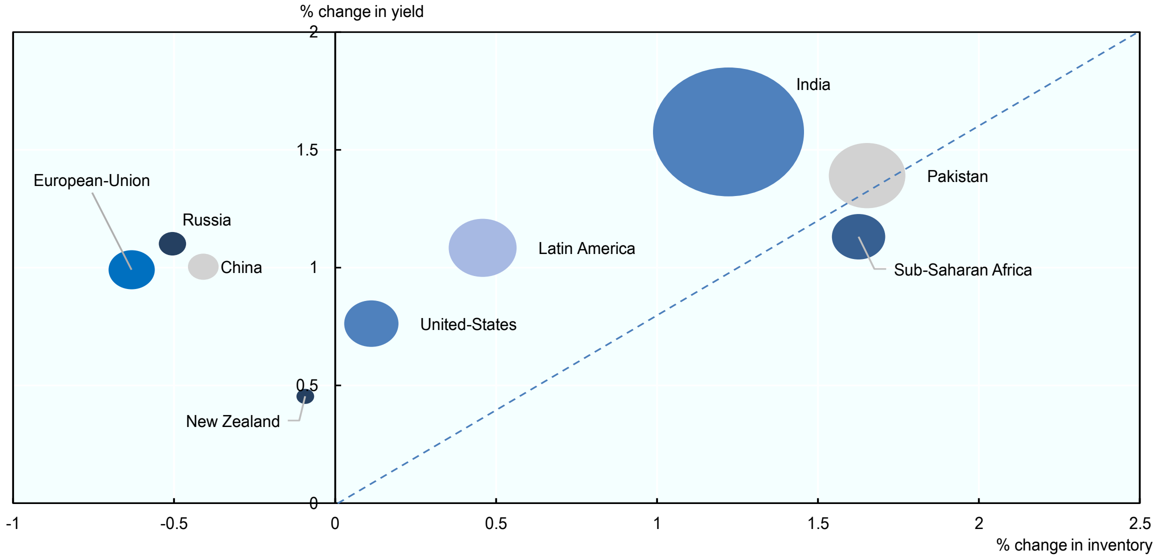
Milk, beef and pork outputs, on the other hand, are projected to grow faster than animal numbers in all regions due to further intensification of these livestock sectors. Global milk production, in particular, is projected to intensify; however, this trend hides important structural differences between main world producers as discussed in the next section. Beef production will also intensify further, including in key producing countries of Latin America, where it will enable strong production growth (0.7% p.a.) with a limited increase in animal numbers (0.2% p.a.). In Argentina, the intensification of production processes through feedlots is continuously improving yields while in pasture-based systems like in Brazil, intensification will be mainly achieved through improved grazing management.

At the global level, livestock production growth will be achieved alongside declining pasture land due to further intensification of pasture and ruminant production, and the growth in non-ruminant meat sectors (poultry and pork) that do not require pasture. This process will be supported by a robust growth in the use of concentrate feed (1.3% p.a), with pasture land mainly declining in regions where the use of this feed is projected to expand most strongly (Section 1.3).

Dairy: Large structural differences persist between major producing countries

Over the coming decade, most dairy production growth will originate from low-income and emerging countries (India and Pakistan in particular) where milk is mostly produced by smallholders in extensive pastoral production systems (Figure 1.19). In these regions, output growth will rely strongly on an increase in dairy inventories, by 21 million and 29 million in India and Sub-Saharan Africa, for instance. This represents two-third of the projected increased in global dairy inventories. Yields will also increase over time, however, given their low base level, the absolute increase in yield will remain small. India's dairy yields, for instance, are expected to reach 1.57 t/head in 2029, seven times lower than projected average yield in the United-States. Dairy productivity in these regions is still constrained by poor quality feed, diseases and dairy animal low genetic potential for milk production. An important share of milking animals in Sub-Saharan Africa for instance is goats, which are characterised by a low productivity per head.

Figure 1.19. Changes in inventories of dairy herds and yields, 2020 to 2029



Note: The size of the bubble reflects absolute growth in dairy production between 2017-19 and 2029.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Lower production growth is projected in leading producers in developed countries (e.g. the United-States) as well as in key milk exporters, the European Union and New Zealand, where increasing environmental requirements (e.g. phosphate, nitrate, GHG emissions), together with land constraints for the latter will also limit further output growth. Production growth, however, will be achieved with stagnant or declining animal inventories, and sustained growth in yields, coming from a combination of improvements to animal genetics, greater feeding efficiency and adjustment to management practices. Absolute yield growth in tonnes per milking animal might still increase faster in developed countries and lead to larger absolute differences in yields.

Livestock intensification and animal welfare

Productivity improvements in animal agriculture can alleviate food security, land use and GHG emissions concerns, as higher production intensity is associated with lower GHG emissions per unit of output. However, the impact of intensification on animal welfare is more complex. At low levels of productivity (e.g. in pastoral production systems), further intensification might lead to improvements in animal nutrition and health care, thereby increasing animal welfare but at higher productivity levels, some production practices (e.g. small pens and cages limiting mobility in confined production systems) might put animal welfare at risk (Leenstra, 2013[3]). Animal welfare policies, which already play an important role in some developed countries, set welfare requirements for farming activities including, for instance, minimum access to outdoor activities for farm animals, housing design standards or caps on farm size. These policies could limit further intensification of some livestock sectors over the next ten years (e.g. poultry and pig).

Global outlook for fish production

Over the outlook period, world fish production is projected to grow at 1.3% p.a., to 200 Mt in 2029 (+24.6 Mt). Asia Pacific, the main producing region, will account for 80% of the global increase. Lower production growth is projected in Latin America, and Europe and Central Asia, two other important fish producers. Strong output growth, however, is expected in Near East and North Africa (1.7% p.a.) and in Sub-Saharan Africa (1.1% p.a.), albeit from lower base levels, together adding less than 2 Mt (Figure 1.16).

Until the 1990s, almost all fish and seafood was obtained through capture fisheries, but since the last 20 years, capture fisheries production has been relatively flat. Aquaculture production, on the other hand, has been growing steadily – notably in China – increasing its role in total fish supply. Over the outlook period, aquaculture production will continue to grow while fish capture production is expected to be remain broadly flat. As a result, by 2024, aquaculture is projected to overtake capture fisheries as the most important source of fish worldwide (Chapter 8).

Despite the projected growth in fish production, global output is expected to grow at a significantly slower pace than over the past decade (1.3% p.a. compared to 2.3% p.a.). This mainly reflects the expectation that China, the main fish producer in the world, will implement more sustainable fisheries and aquaculture policies, in line with its 13th Five-Year Plan. This is expected to lead to an initial reduction in capacity but will result in productivity improvements in the aquaculture sector over the second half of the projection period.

Environmental impact of agricultural production

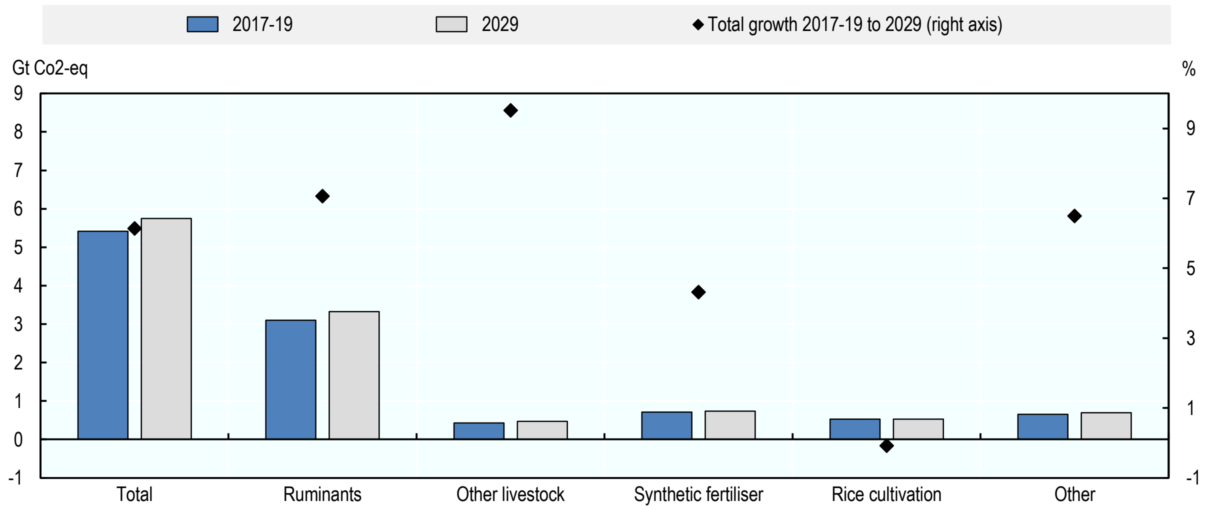
Direct GHG emissions

Direct emissions from agriculture account for about 11% of global GHG emissions. Livestock (in particular ruminants) are currently responsible for two-thirds of agriculture's direct emissions, mainly through enteric fermentation. Other important sources of direct GHG emissions include the application of synthetic fertilisers to agricultural soils (13%) and anaerobic decomposition of organic matters on paddy rice fields (10%) (Figure 1.20).

Over the outlook period, and assuming no changes in current policies and technologies, projections suggest a growth in direct GHG emissions of 6%, an increase of 332 MtCO2-e from the base period. Livestock will account for 80% of this global increase. Geographically, most of the increase in direct emissions is projected to occur in emerging and low-income regions due to higher output growth in production systems that are more emission intensive. Sub-Saharan Africa alone is expected to account for 48% of the global increase in direct GHG emissions, and Asia Pacific for another 46% (50% of which will originate from India and China).

Global agricultural emissions are set to increase but the carbon intensity of production is declining over time. Over the next ten years, most world regions are expected to further reduce the emission intensity of their agricultural production (Figure 1.21). In Europe and Central Asia, output growth is projected to be matched with a decrease in direct GHG emissions (-0.15% p.a.), partly due to further yield improvements, but mostly as a result of a declining share of ruminant production in total production. This is mainly driven by the projected decline in beef output in the European Union over the next ten years. In the Americas, Asia Pacific and Near East and North Africa, strong growth in crop and livestock production are expected to be achieved with a much slower growth in direct GHG emissions. In Sub-Saharan Africa, however, agricultural production and direct GHG emissions are projected to grow more in step, mainly because output growth will be strongly reliant on increasing animal numbers in extensive ruminant production systems. A further reduction of the carbon intensity of agricultural production could be achieved by large-scale adoption of emission reducing technologies. The effect of technology adoption on direct GHG emissions from agriculture requires a more detailed reporting to be visible in GHG emission statistics.

Figure 1.20. Direct GHG emission from crop and livestock production, by activity



Note: The category "other" includes direct GHG emissions from burning crop residues, burning savanna, crop residues, and cultivation of organic soils.
Source: FAO (2019). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT; OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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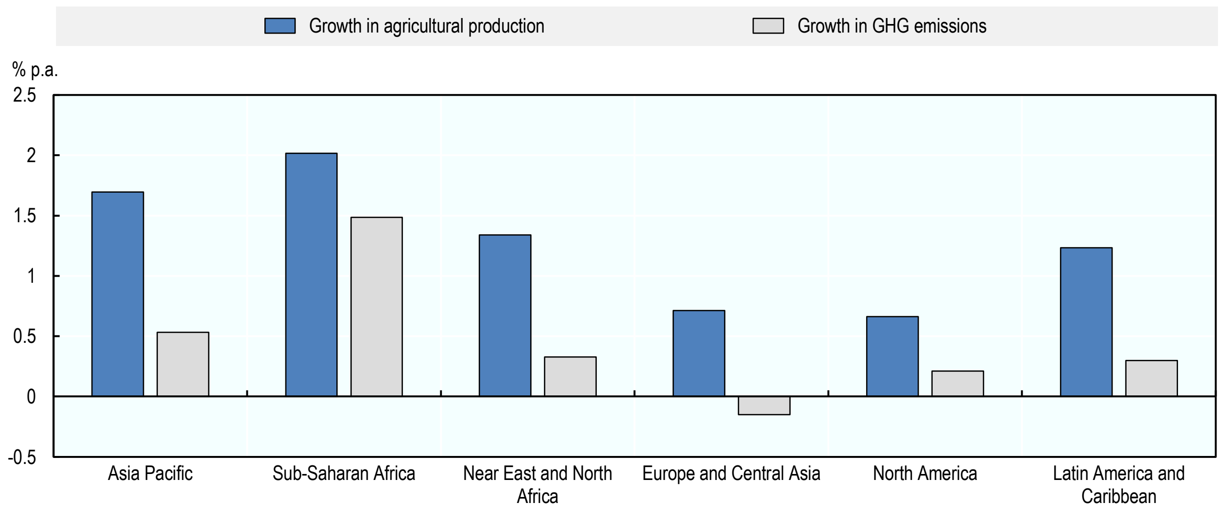
Figure 1.21. Annual change in agricultural production and direct GHG emissions, 2020 to 2029



Note: Figure shows projected annual growth in direct GHG emissions from agriculture together with annual growth in the estimated net value of production of crop and livestock commodities covered in the Outlook (in billions of USD, measured at constant 2004-6 prices).
Source: FAO (2019). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT; OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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The agricultural sector has a key role to play in climate change mitigation as it is a major emitter of GHG emissions worldwide. A number of supply-side and demand-side policy options exist to reduce GHG emissions from agriculture, although so far their uptake has been limited. Effective mitigation strategies in the agricultural sector also require collaboration at the national and international level (Box 1.1).

In parallel to public policies, an increasing number of private industry initiatives are emerging, particularly in livestock sectors, which seek to measure and benchmark GHG emissions and in some cases set ambitious mitigation goals (OECD, 2020[4]). In the European Union (e.g. Ireland, Netherlands, France), New Zealand, Australia, and the United States, for example, the dairy industry has recently committed to reduce GHG emissions from the sector through a number of actions, including the promotion of good agricultural practices among farmers (e.g. soil conservation measures, grazing preservation, improved feed efficiency) and the development of tools to monitor on-farm GHG emissions (Origin Green IRELAND, n.d.[5]; Zuivelketen, n.d.[6]; CNIEL, 2020[7]; DairyNZ, n.d.[8]; Dairy Australia, 2019[9]; U.S. Dairy, n.d.[10]). In addition to their branding and marketing benefits, these initiatives can support the achievement of national mitigation goals for the agriculture, forestry and land use (AFOLU) sector.

Box 1.1. The role of agriculture for climate change mitigation

The agriculture, land use and forestry sector is the second largest contributor to global greenhouse gases (GHG) emissions, after the energy sector. Overall, there is a growing recognition of the large mitigation potential of the sector and an increasing awareness of the need to reduce GHG emissions from agriculture. In recent years, a number of countries have set GHG emission reduction targets for agriculture, either as part of their Nationally Determined Contributions to the Paris Agreement or, more typically, as part of their national mitigation strategies. However, the implementation of policies to incentivize these emission reductions is still ongoing. Moreover, governments face social and political challenges for implementing mitigation policies in the sector, not least in balancing emission reductions with the need to feed billions of people every day. If no further collective progress is made over the coming decade, direct and indirect emissions from agriculture could become the largest source of global emissions by mid-century, as more rapid decarbonisation in is anticipated in other sectors (e.g. energy). Recent OECD work on the topic offers a number of recommendations for effective mitigation strategies in the agricultural sector

- Governments should, first, roll back market-distorting agriculture subsidies. It has been shown that the most distortive forms of support also tend to be the most environmentally harmful. Many countries have taken significant steps in reforming support policies in the early 2010s, but further progress has been limited since then.
- Market-based instruments that aim to reduce GHG emissions, such as carbon taxes, emissions trading schemes, and abatement payment schemes, are the most cost-effective ways to cut emissions from agriculture, even though they introduce different trade-offs for farmers, consumers and taxpayers and are challenging to implement. A significant implementation challenge for all of these policies include difficulties in measuring agriculture emissions, which are mainly from diffuse heterogeneous sources.
- Co-operation at the national and international level is key for climate change mitigation in the agricultural sector, because unilateral approaches, using carbon pricing, can cause emissions leakage by increasing emissions in unregulated countries. Countervailing measures like carbon border taxes can reduce, but not eliminate this effect.
- Reducing food losses and waste along the supply chain through to consumers could significantly lower GHG emissions, but might be costly to achieve. Information about the emission contents of products could encourage people to switch to lower emission diets.

- Increased agriculture productivity growth can help to reduce GHG emissions while alleviating food security concerns. One example is precision agriculture, where global positioning systems and sensors, for instance, are helping to lower fertilizer use in crop production. For cattle, improving feed rations and breeding technologies can help reduce associated GHG emissions.
- Forestry and agro-forestry play important roles as a carbon sink. Even though the amount of carbon that can be captured is limited, natural and sustainably managed forests can considerably help to mitigate GHG emissions from the AFOLU sector

The importance of sending clear and consistent policy signals to the agricultural sector cannot be overstated as the high levels of support to agriculture in many countries are likely to counteract the effectiveness of mitigation policies in many instances, raising concerns with regard to policy coherence. Clear signals are also necessary to allow farmers to make investment decisions that can facilitate the transition to low carbon agriculture, particularly in farming systems with high fixed investment costs.

Source: (OECD, 2019[11]; Henderson and Lankoski, 2019[12]; OECD, 2020[4])

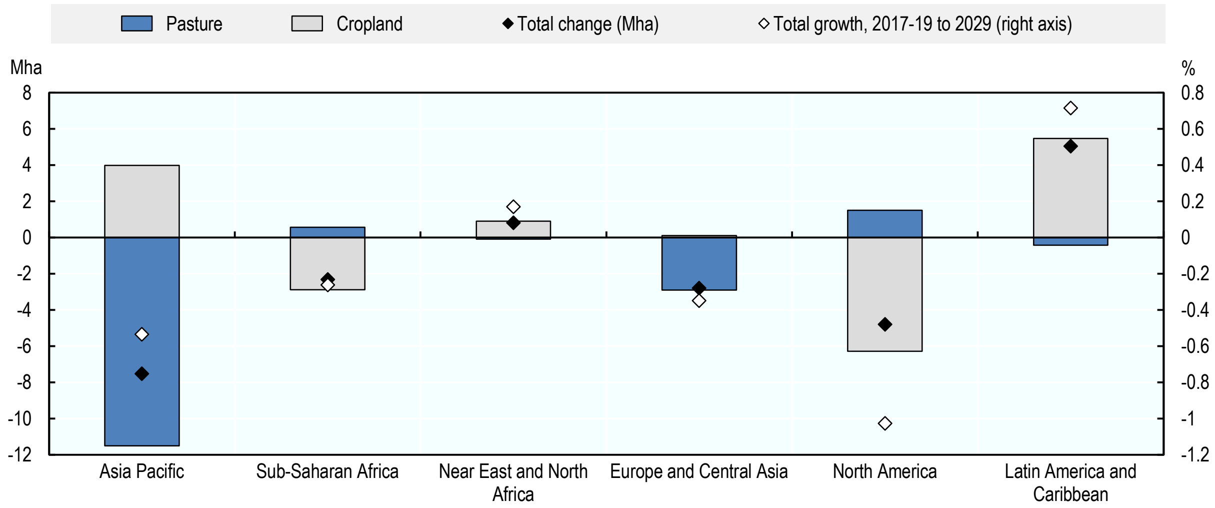
Environmental effects of agricultural land use

Agriculture currently uses 40% of the world's land, 70% of which is pasture land. Globally, agricultural land use is expected to remain at current levels during the coming decade as an increase in cropland offsets a decrease in pasture, in line with historic trends. However, trends in land use, and their underlying determinants, differ around the world.

In Latin America, cropland use is expected to expand by about 5.5 Mha over the next ten years while pastureland will decline by only 0.4 Mha, resulting in a total increase in agricultural land of 5 Mha (0.7%). Large-scale commercial farms in the region are expected to remain profitable and invest in the clearing and cultivation of new land, including previous pasture land, for soybean and maize production. A significant increase in cropland is also expected in the Asia Pacific region (4 Mha), but this is projected to be more than counterbalanced by a decline in pasture land (more than 11 Mha), which will be enabled by further intensification of pasture and ruminant production. More limited land use changes are expected in other world regions (Figure 1.22). Despite substantial land availability in Sub-Saharan Africa, for instance, total agricultural land use is projected to slightly decline (-0.3%) over the next ten years. Farmland expansion will be mainly constrained by the prevailing smallholder structure, the presence of conflict in land- abundant countries, and the loss of agricultural land to other uses such as mining and urban sprawl.

Agricultural expansion through clearing or conversion of forest, shrub land, savannah and grassland has been responsible for substantial CO_2 emissions from the loss of above and below-ground carbon sinks, and is associated with negative effects on biodiversity. When taking into account those indirect effects of agriculture on land use change, agriculture's contribution to global GHG emissions increases from 11% to 24%. In 2018, global land use and forest emissions amounted to 3.4 Gt CO_2-e, most of which was coming from burning biomass and deforestation. However, indirect emissions have been declining over time (-1.6% p.a. between 2000 and 2018), mainly due to efforts to reduce deforestation rates, in particular in countries such as Brazil and Indonesia. The future evolution of these emissions is not projected in this *Outlook*.

Figure 1.22. Change in agricultural land use, 2017-19 to 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Other environmental impacts

In many countries, irrigated agriculture is the main user of water resources, accounting for about 70% of global freshwater withdrawal. Irrigated farming has played a key role in agricultural production growth by enabling strong growth in yields. However, despite significant improvements in water productivity by agriculture over the last decades, continuing efforts are needed to increase water use efficiency, improve water management, and reduce water pollution from nutrient run-off, pesticides, soil sediments, and livestock effluents. Moreover, in coming decades, agricultural production in many regions will be subject to increasing water risks, coming from climate variability, extreme events, depletion of groundwater resources, and growing resource competition from other sectors (Gruère, Ashley and Cadilhon, 2018[13]).

As a major user of land in many countries, agriculture has a large impact on biodiversity. Agricultural production depends on biodiversity for the provision of essential ecosystem services such as pollination, pest control, and nutrient cycling. However, agricultural land use and production practices have both beneficial and harmful impacts on biodiversity. Traditional agricultural practices can create diverse semi-natural habitats (e.g. extensive pastures and meadows) whose species depend on their existence and on the continuation of certain beneficial practices, such as low intensity grazing. At the same time, these agricultural production systems may have lower yields that require more land to be put into production. Agricultural intensification (e.g. increased use of fertilizers and pesticides), specialisation and rationalisation, on the other hand, can also require the clearing of natural ecosystems for agricultural expansion and can contribute to a loss of both semi-natural habitats and species abundance (Lankoski, 2016[14]). Over the coming decade, greater efforts are needed to reduce the pressure exerted by some agriculture practices on biodiversity while enhancing agriculture's positive contributions to the environment; agriculture being dependant on ecosystems services for its continuing development (OECD, 2018[15]).

1.4. Trade

Trade plays a critical key role in enabling a more efficient and sustainable global food system, as product moves from countries/regions where resources are comparatively well endowed to those that are less well endowed. This is particularly true for agriculture, where land and water resources, climatic conditions, and population densities vary considerably among countries and regions. As trade barriers, both technical/economic and policy in nature, have been lowered or removed, trade has increased considerably over the last decades, particularly with the signing of numerous trade agreements. As reductions in these barriers have occurred, growth in trade has contributed to a more efficient allocation of agricultural production across countries and regions. In the next decade, trade will increasingly reflect diverging demand and supply developments among trading partners. Some regions are projected to experience the largest population or income-driven increases in food demand but do not necessarily have the resources for a corresponding increase in agricultural output. Moreover, changing nutritional preferences and requirements are changing the profile of demand in most regions. Divergent productivity growth, impacts on production from climate change, and developments in animal or crop diseases will affect supply potential. In this context, appropriate enabling trade policies will mitigate emerging regional imbalances and support sustainable global development, particularly with regard to meeting the sustainable development goals (SDGs). This is even more important considering that low- and middle-income countries account for approximately one third of global trade in food and agricultural products.

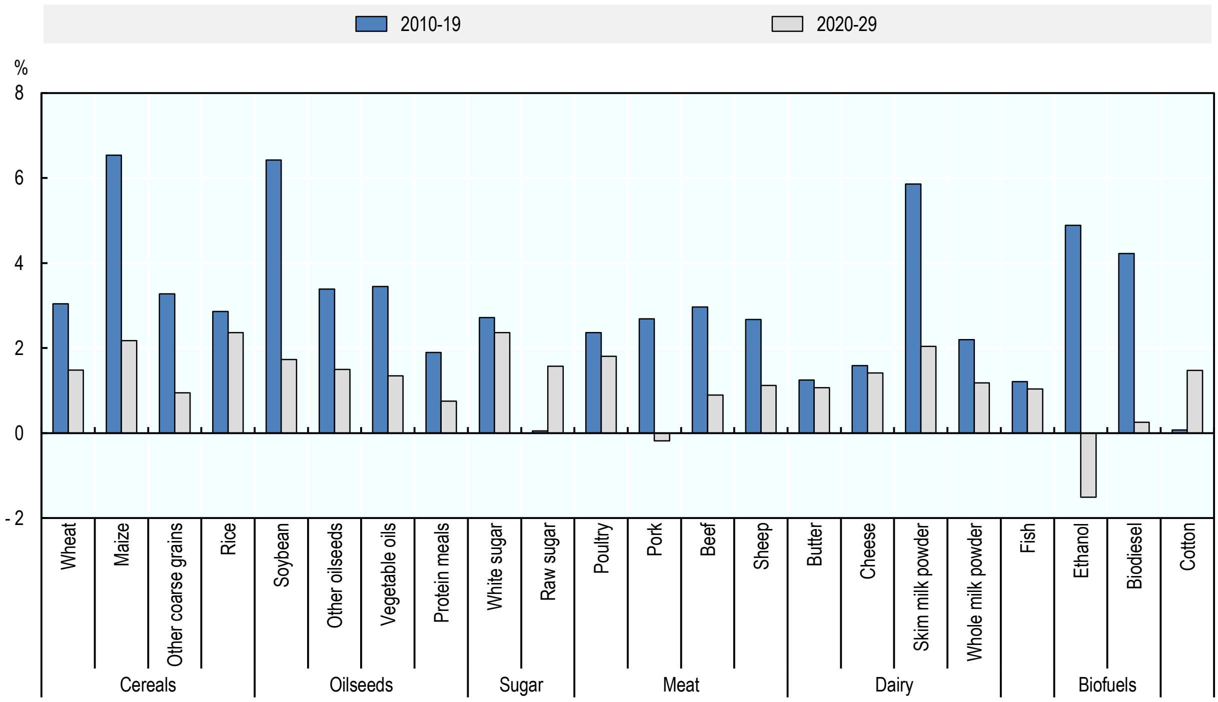
Growth in agricultural and fish trade is slowing

Agricultural trade is anticipated to continue to grow over the outlook period, albeit at significantly slower pace than over the previous decade. Trade had grown rapidly since the early 2000s, supported by a lowering of agro-food tariffs and trade-distorting producer support in the wake of the Uruguay Round. Agricultural trade has also been supported by strong economic growth in emerging and developing countries, particularly in China, but also in other countries in South East Asia and Africa, and by the rapid growth of the biofuel sector, particularly the growth of biodiesel production in the European Union. Excess demand spurred higher real prices and was met by higher additional supplies largely from Latin America, North America and Eastern Europe. Over the outlook period, slower global demand growth triggered by a slowdown in demand growth in China and other emerging economies, and lower global demand growth for biofuels given developments in the energy sector and in biofuels policies is expected to result in a slower growth in trade.

Aggregate trade for the commodities covered in this *Outlook* is projected to grow at 1.2% p.a. over the projection period, compared to 2.8% p.a. over the previous decade. Figure 1.23 displays the projected average annual growth rates for the global trade in agricultural commodities, in volume terms. In general, the projections indicate a broad decline in commodity trade across all commodities, except for sugar and cotton, with considerable slowing in trade anticipated for maize, soybeans and biofuel products.

New digital technologies have the potential to enhance agro-food trade, and improve food security and safety over the coming decade by enabling more efficient and transparent agricultural value chains, as discussed in Box 1.2.

Figure 1.23. Growth in trade volumes, by commodity



Note: Annual growth rate of trade volumes as calculated from 2004-06 reference prices.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Box 1.2. Digital innovations shaping the future of agri-food trade

In our increasingly digital world, there are new opportunities that are going to improve efficiency, transparency and traceability in agricultural trade over the coming decade (Tripoli and Schmidhuber, 2019[16]; Jouanjean, 2019[17]).

Challenges for trade and supply chains are often related to how data are collected, analysed and shared. Whether it is the sheer quantity of often duplicated paper documents or the reliance on human labour to check and clear goods, an international trade transaction is well known for lacking efficiency. Legacy trade processes are complex, expensive, and time-consuming, often resulting in long payment terms. In addition, too often food chains have insufficient levels of transparency and traceability to prevent and mitigate food safety risks and food fraud or enforce compliance with sustainability standards.

New digital technologies are changing the way we use data collection and analysis to produce, trade and consume food and other primary products. Digital technologies, such as the Internet of Things (IoTs), artificial intelligence and machine learning, big data analytics, and distributed ledger technologies (DLTs) have the potential to support increasingly smarter agricultural value chains by: enabling actors to collect data on how agricultural products are produced, processed, transported and stored; analysing data for predictive and data-driven decision making; and sharing data securely along complex agricultural value chains (Tripoli and Schmidhuber, 2018[18]).

Efficiency gains from the adoption of digital technologies by actors in agricultural value chains are projected to lead to increases in production and trade over the next decade. One estimate predicts technological change will increase trade growth by 31 to 34 percentage points until 2030 (WTO, 2018[19]). Technology can generate greater efficiency and increase agri-food trade in several ways. For example, e-commerce and digital trade finance platforms can increase market opportunities for micro, small and medium-sized enterprises by connecting producers to consumers, reducing payment risk and increasing access to trade finance (Tripoli and Schmidhuber, 2018[18]). In addition, the adaptation of digital trade certificates can facilitate trade in the projections by eliminating paper documentation, reducing fraud and enabling faster border procedures, all of which reduce costs (Tripoli and Schmidhuber, 2019[16]). The ePhyto Solution developed by the International Plant Protection Convention (IPPC) is one example that helps governments and companies facilitate trade in plants and plant products by providing a standardised approach for the exchange of electronic phytosanitary certificates. Numerous countries are already using e-phyto certificates with many more planning to adopt the technology in the future. Lastly, by collecting and tracking product data as products move through value chains, digital technologies can help improve compliance with food safety standards and rules of origin (Tripoli and Schmidhuber, 2018[18]). This enhanced traceability can increase market participation from the greater compliance with trade rules and by serving consumers that increasingly expect more detailed information on the food they purchase.

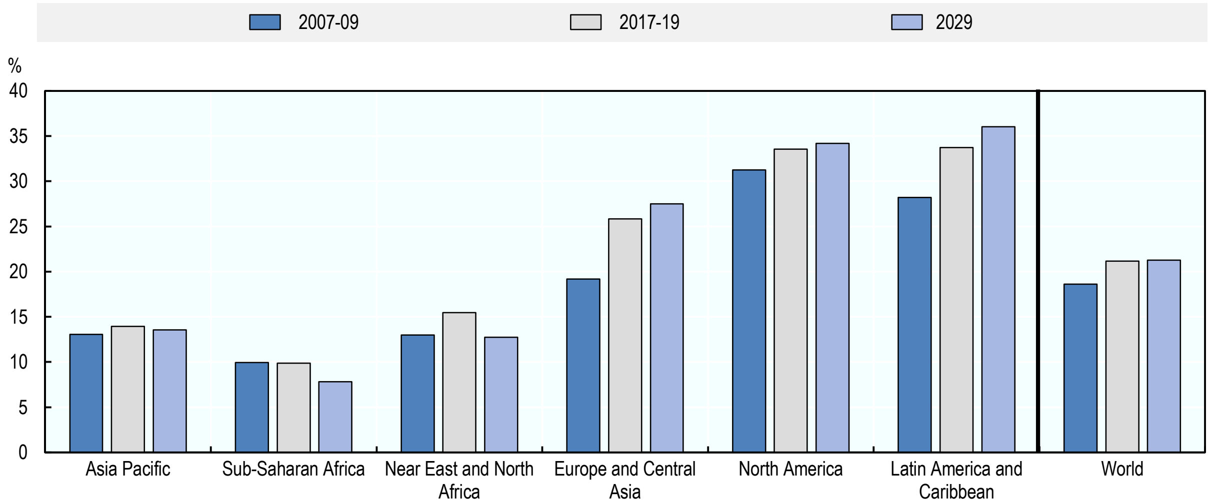
Blockchain is an example of one technology that can facilitate trade over the coming decade. Recently, Cargill and Agrocorp executed a USD 12 million intercontinental wheat trade transaction using blockchain, which was completed in a matter of hours compared to the several weeks the process traditionally takes. Blockchain and smart contracts helped to reduce the time spent in exchanging and processing documents by more than 50% (Ellis, 2020[20]).

The baseline projections of the 2020 *OECD-FAO Agricultural Outlook* incorporate the positive effects digital technologies can have on farmers to manage their risks and engage more effectively in global trade and value chains. Nevertheless, for the agriculture sector to reap the benefits of digital technology, there are a number of challenges that must be addressed by both the public and private sectors. A few of these challenges that are needed to facilitate digital trade include: updating regulatory frameworks, improving digital and physical infrastructure, incentivizing stakeholder buy-in to uptake new technologies, capacity development to improve digital skills at the government and farm levels and promoting interoperability between legacy systems and new technologies (Tripoli and Schmidhuber, 2018[18]; Tripoli, 2020[21]). Both the public and private sectors will need to commit both financial resources and human capital to enable the transition to digital trade and for it to reach its fullest potential.

Trade relative to output is stabilizing

Global trade relative to production for the commodities covered in the *Outlook* has been gradually increasing over time, rising from 15% in 2000, to 21% in 2019, and reflects a trade sector that has been growing at a faster pace than overall agricultural production. Assuming a diminishing impact of previous trade liberalisations that boosted global agricultural trade, the commodity projections in the *Outlook* indicate that trade relative to production will increase only marginally over the next decade as growth in trade will be more closely aligned with growth in output. For imports, rising trade relative to output is being driven largely by the Asia and Pacific region, where it will rise to 20% of production value, by countries in the Middle East and North Africa region where it will rise to 94%, and by Sub-Saharan Africa where it will rise to 33% by 2029. From an export perspective, Latin America and the Caribbean, North America, and Eastern Europe and Central Asia have been the key supplying regions, and exports relative to net domestic agriculture and fish production is projected to rise to 36%, 34% and 32% respectively in 2029 (Figure 1.24).

Figure 1.24. Value of agriculture and fish exports relative to production by region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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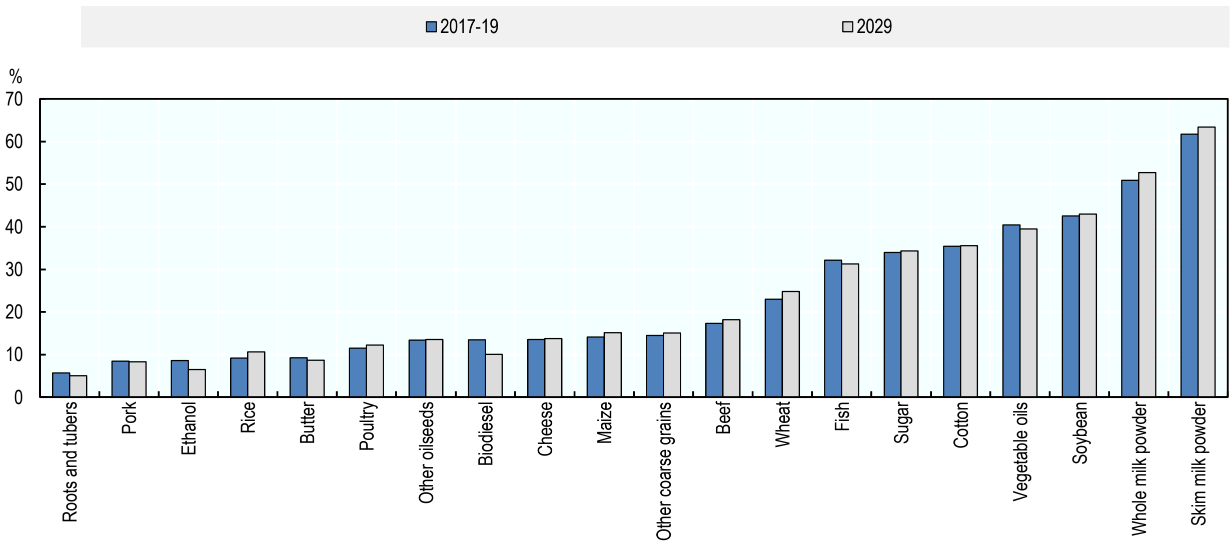
The shares of production traded by commodity are shown in Figure 1.25. Highly traded commodities such as wheat, soybeans and milk powders are those demanded for further local processing by importing countries. A number of commodities may have their export ratios decline marginally over the outlook period, reflecting either weakness in import demand, or in the case of vegetable oil, increasing domestic use for biodiesel production, especially in Indonesia.

Figure 1.25. Share of production traded, by commodity



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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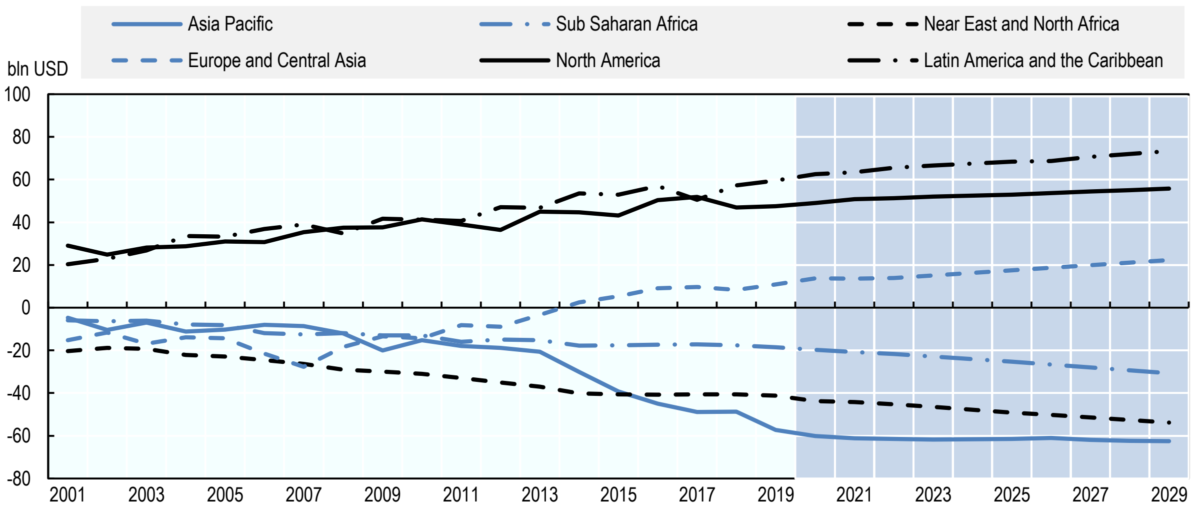
Specialisation among the regions is increasing

Over the coming decade, world trade in agricultural commodities is expected to continue to develop according to comparative advantage, given the relative availability of natural resources. Widening trade balances reflect per capita availability of agricultural land. For example, the Americas have the most land available (1 ha/capita) and the Asia and Pacific region has the lowest availability of land on a per capita basis (0.3 ha/capita). Net exports continue to increase from the Americas while net imports increase by the Asia and Pacific region (Figure 1.26). Other regions range between these two extremes, with the exception of Near East and North Africa, where extreme water resource constraints exist which limit local production response. Accordingly, established net exporters of agricultural commodities are expected to increase their trade surpluses while regions with important population growth or land or other natural resources constraints, are expected to see their trade deficit widening. Amidst this continuing differentiation between net importing and net exporting regions, the number of exporters is expected to remain relatively small, while the number of importers is expected to grow. While this paradigm of comparative advantage given resource availability applies, relative productivity given available resources is also a critical determinant of trade patterns and will also affect developments in the longer term. For example, reducing the yield gap in Sub-Saharan Africa would improve the region's self-sufficiency and reduce its trade deficit.

Figure 1.26. Agricultural trade balances by region, in constant value



Note: Net trade (exports minus imports) of commodities covered in the *OECD-FAO Agricultural Outlook*, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141513

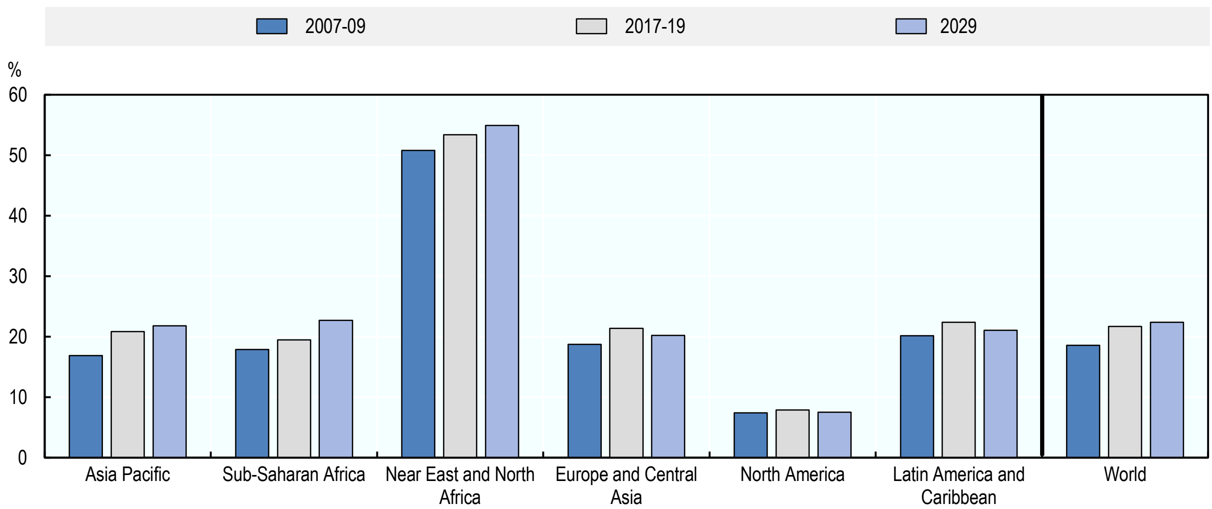
Latin America and the Caribbean is expected to reinforce its position as the world's prime supplier of agricultural commodities, with an average growth in net exports of 1.7% p.a. over the outlook period. Increased production of maize, soybeans, beef, poultry and sugar will facilitate this expansion. Net exports from North America, the second leading supplier of agricultural commodities to world markets, are expected to expand at slower pace (1.3% p.a.) over the outlook period, due to a more limited expansion in agricultural output. Exports of maize and soybeans, in particular, will significantly slowdown from a rate of 5% p.a. in the last decade to about 2% p.a. Over the coming decade, net exports from Eastern Europe and Central Asia are projected to increase by 47% from base period levels, largely due to higher exports from the Russian Federation and Ukraine. As a result of this significant expansion in agricultural export, the region will emerge as the third main net-exporting region in the world. Rising productivity in combination with slow domestic demand due to low population growth will be the primary reason behind this trend.

In contrast, net imports by the largest net importing region, Asia and the Pacific, are projected to increase by a further 21% from the base period, largely due to increasing imports by China. Net imports by Sub-Saharan Africa will rise by over 70% by 2029 compared to the base period due to higher imports of wheat, maize and soybeans. Net imports by Near East and North Africa, the second largest importing region, are expected to rise to over 32% by 2029, further deepening the region's dependence on international markets. Near East and North Africa will remain the largest importer of basic foods on a per capita basis.

The role of trade in food security and livelihoods

Food imports play an increasingly important role in ensuring global food security providing improved access to food and nutrition. This is particularly true for resource-constrained countries, which are highly dependent on the import of basic and high value food commodities; imports may account for a large share of their total calorie and protein availability (Figure 1.27). An enabling trade environment thus increases availability in these countries and may moderate pressures on consumer prices. In a country experiencing declines in production due to a weather-induced shortfall, trade can contribute towards food security in terms of both availability and access (FAO, 2018[22]). Furthermore, trade can have a positive effect on utilization, as it allows for greater diversity in the food available, particularly in regions where the climatic factors may not be suitable for the production of a large variety of crops, nor allow for the production of sufficient quantities to ensure domestic food-security such as in the Near East and North Africa region.

Figure 1.27. Imports as a share of total calorie availability for selected regions



Note: Calculations using average calorie content of commodities included in the *Outlook*. Note that imports include feed, and availability includes processing of commodities which may be re-exported.
Source: FAOSTAT (2020). OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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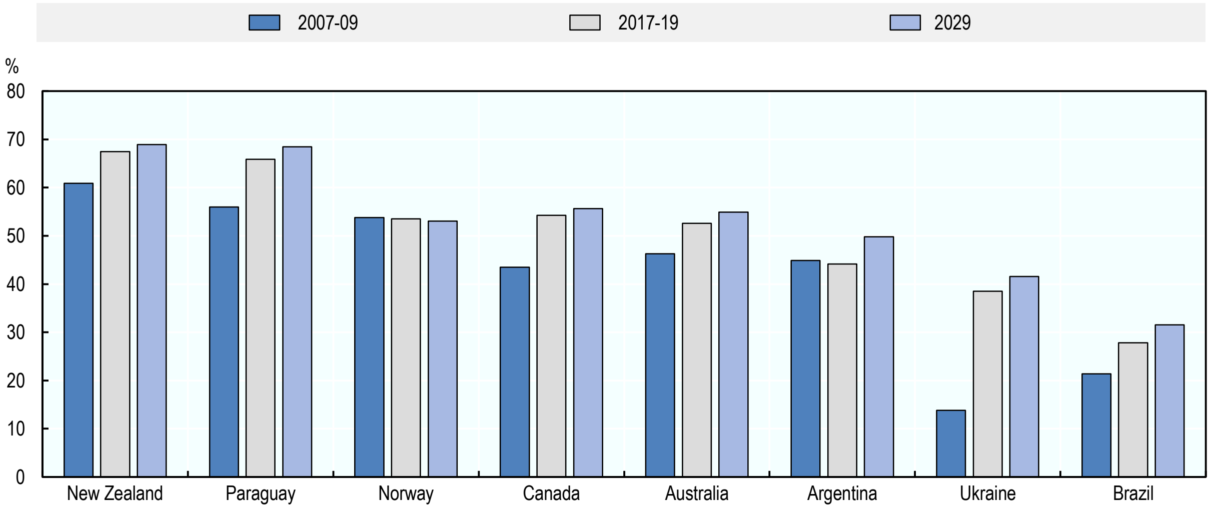
Exports are critical to livelihoods in many countries

For many countries, trade plays a central role in sectoral performance. Exports of some agricultural commodities account for a large share of domestic production and are therefore an important source of income and an opportunity to access growing markets without depressing local markets. For many developing countries, exports of commodities not included in this *Outlook*, such as fruits and vegetables, tea, cocoa and fibres, provide a substantial source of income. However, international market fluctuations and shocks as well as changes in trade policies may inordinately affect their rural or coastal sectors. As measured by the ratio of the net value of exports to net value of domestic production for the commodities included in the *Outlook*, eight countries will continue to have high dependency on international markets (Figure 1.28). While some of these countries, such as Canada and Brazil, export a wide set of commodities, some others such as New Zealand, Paraguay and Norway, depend on just a few commodities (dairy products, oilseed products and fish, respectively).

Figure 1.28. Exporting countries with greater than 25% dependency on foreign markets



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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The role of trade in nutrition

Beyond the importance of trade in facilitating global food security, trade will also increasingly be central to ensuring nutrition security in exporting and importing countries alike. The projections in this *Outlook* indicate that, as consumption growth outpaces production growth in the developing world, many countries will see an increasing share of their food demand met by imports. For example, in Southeast Asia, where rising incomes are altering consumer preferences, an increasing share of demand for meat (especially poultry and bovine meat) will be met through imports. Similarly, increasing demand for milk powders in Near East and North Africa, Southeast Asia, and Sub-Saharan Africa will be met by suppliers in the developed world.

While a greater openness to trade can positively impact the affordability and availability of different foods, add to a wider choice for consumers and thus help to diversify diets, the rise in the international food trade, especially through imports, can be associated with a greater availability of less healthy foods, including ultra-processed foods, to the detriment of dietary quality. Particularly in view of the increasing incidence of various forms of food-related non-communicable diseases globally, targeted domestic policies designed to improve the nutritional status of the population are additionally needed to maximize the positive net effects of trade on nutritional outcomes (FAO, 2018[23]).

Trade policies

Trade has been an engine of transformation of the global agriculture and food sector. Changes in trade policies have been critical in facilitating this transformation by reducing both tariff and non-tariff barriers which have limited the movement of goods and services. The results of reducing barriers has been to increase the welfare of consumer and producers in capturing the welfare benefits of increased market efficiency. Major developments in trade policy that will be negotiated/implemented over the next decade will potentially increase intra-regional trade and inter-regional trade. A detailed discussion on trade negotiations with a potential strong impact on global agricultural trade is provided in the uncertainty section. A broad global trade agreement (WTO) is not anticipated.

The presented baseline incorporates only implemented or ratified bilateral trade agreements such as the African Continental Free Trade Agreement (AfCFTA) which came into force in May 2019 and will achieve duty free trade on 90% of products in internal African trade by July 2020, and a further 7% of such products by 2029. This should improve market efficiency within the region, although non-tariff barriers such as weak transportation links may limit the extent of market integration.

1.5. Prices

The *Outlook* uses international trade prices at key markets as reference prices for each agricultural commodity. Historical observations are used to describe previous developments while projected values reflect future market trends. Near-term price projections are still influenced by the effects of recent market events (e.g. droughts, plant and animal diseases, policy changes), whereas in the later years of the projection period, price projections are driven by fundamental supply and demand conditions only. Potential price variability is explored in a partial stochastic analysis (see below).

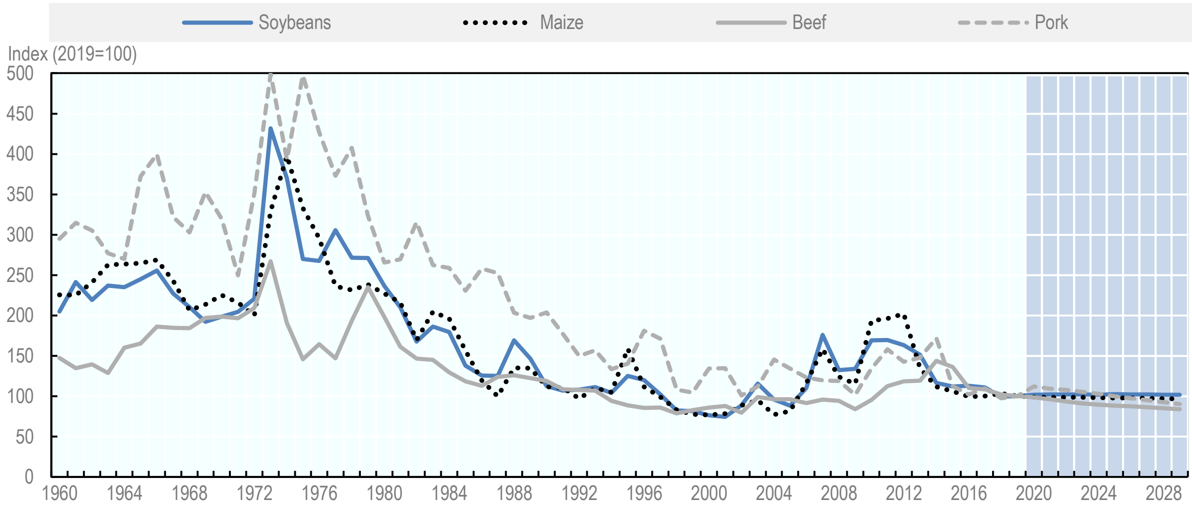
Over the coming decade, most of the commodities covered in the *Outlook* are expected to see real price declines, suggesting that, under the assumptions made by this *Outlook*, price reducing-factors (mainly productivity improvements) are expected to dominate factors leading to higher prices, such as resource constraints and higher demand induced by population and income growth.

On the supply side, the *Outlook* projects strong yield growth in emerging and low-income countries due to technological catch-up and the adoption of better management practices. In developed regions, technological innovation (e.g. plant and animal breeding) and efficiency gains will also enable further yield improvements. The resulting price projections assume that this continuing productivity growth lowers marginal production costs and that all additional resources can be mobilised at these lower prices. On the demand side, global population growth is slowing down, so too is income growth in emerging economies, where consumers also have a declining propensity to spend their additional income on food.

This expected decline in real prices is consistent with a long-term downward trend in agricultural commodity prices (Figure 1.29). Historical data show that the prices of agricultural commodities tend to be highly correlated and to follow a declining trend over the long run. The prices of different crops (here soybean and maize) and livestock commodities (here beef and pork), in particular, tend to follow similar developments. Over the coming decade, meat prices are projected to decrease more strongly (-1.8% p.a.), partly as a reflection of their current high levels, while crops prices will experience a more modest decline (-0.3% p.a.).

Another way of assessing the evolution of prices is through the expected future path of the FAO Food Price Index (FPI). This index, introduced in 1996, captures the development of nominal prices for a range of agricultural commodities in five commodity groups (cereal, vegetable oil, sugar, dairy and meat), weighted with the average export shares of these groups in 2002-2004. As this commodity price index is similar in commodity coverage to the *Agricultural Outlook*, it is possible to project the future evolution of the FPI as a summary measure of the evolution of nominal agricultural commodity prices (Figure 1.30).

Figure 1.29. Long-term evolution of commodity prices, in real terms



Note: Historical data for soybeans, maize and beef from World Bank, "World Commodity Price Data" (1960-1989). Historical data for pork from USDA QuickStats (1960-1989).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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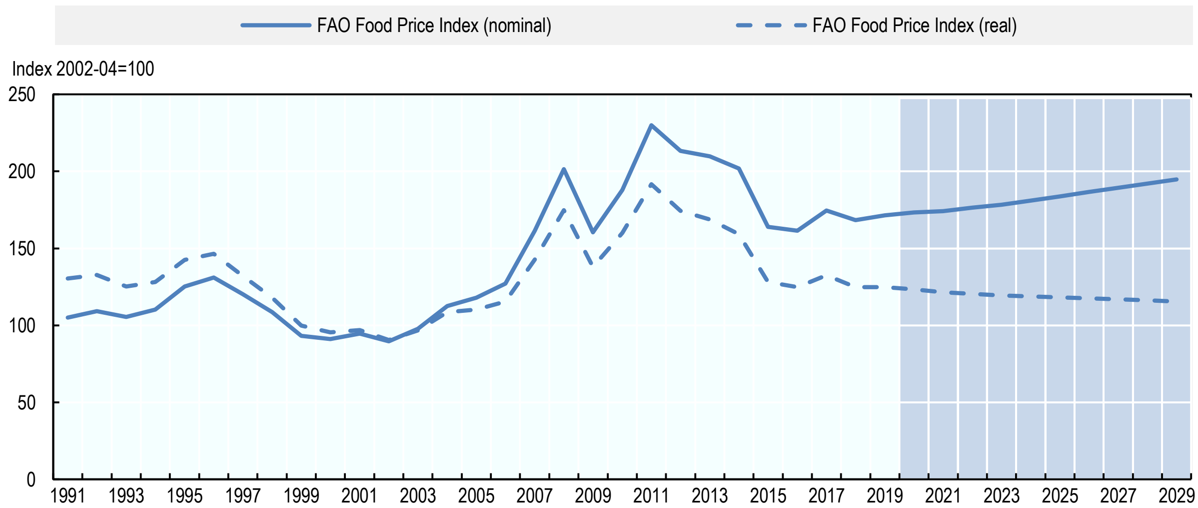
Figure 1.30. Projected evolution of FAO FOOD Price Index



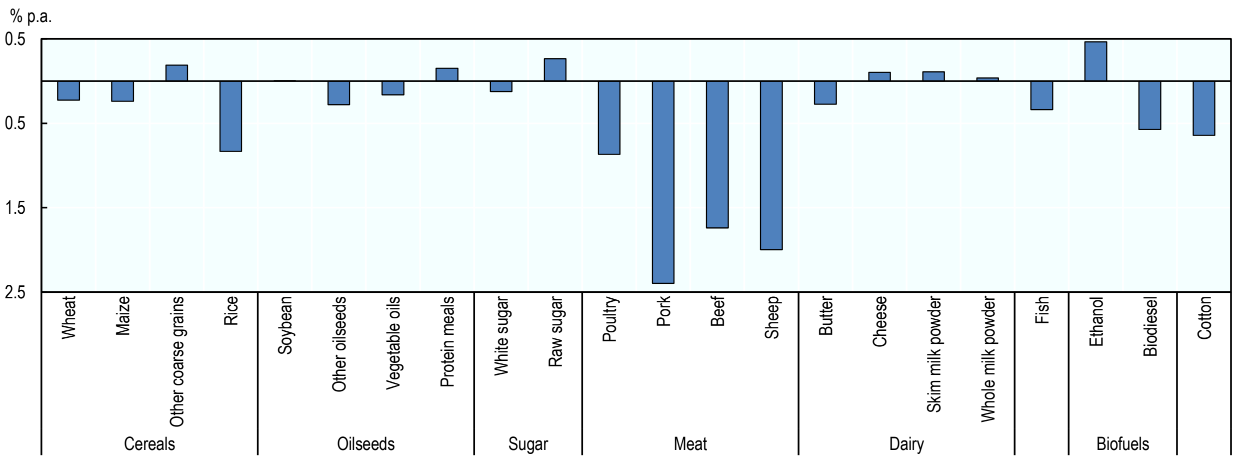
Note: Historical data is based on the FAO Food Price Index, which collects information on nominal agricultural commodity prices; these are projected forward using the *OECD-FAO Agricultural Outlook* baseline. Real values are obtained by dividing the FAO Food Price Index by the US GDP deflator (2002-04 = 1).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141589

Based on the supply and demand conditions projected in the *Outlook*, nominal agricultural commodity prices as summarised by the FAO FPI are expected to grow by only 1% p.a. over the coming decade. In real terms, the FAO FPI is projected to decline by 0.7% p.a. over the next ten years. While agricultural commodities prices are expected to be below the peaks seen in 2006-08 and in 2013-14, they will remain above early 2000s price levels, both in nominal and real terms.

A more detailed view by commodity is provided in Figure 1.31, which shows the projected average annual real price change over the outlook period. Overall, most of the commodities covered in the *Outlook* are expected to see real price changes of less than 1% p.a. over the coming decade, with the exception of meat.

Figure 1.31. Average annual real price change for agricultural commodities, 2020-29



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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The pronounced price decline for all meats is against their current high levels resulting from supply constraints in a number of Asian countries and the resulting strong import demand on international markets. This is particularly true in the pigmeat sector where the African Swine Fever outbreak has resulted in a drop in output in the two main producing countries (China and Viet Nam), leading to strong import demand growth in 2019. Declining pork output in Asia also led to a growing import demand for other meat types (substitution effect), keeping their prices at high levels. Sheep prices, in particular, have been supported by both the strong import demand from China and supply constraints in Oceania. As production gradually recover over the second half of the projection period, meat prices are projected to decline in real terms. However, this trend of declining prices also reflects longer-term supply and demand conditions. Meat production is projected to expand over the coming decade through a combination of higher carcass weight per animal and growing herd and flock sizes, in particular in low-income and emerging countries. Demand growth for meat, on the other hand, is expected to slow down, given slower income growth in several regions, ageing populations and the decrease in per capita meat consumption in a number of high-income countries.

For cereals, the increase in global production together with the ongoing destocking of maize and rice in China will continue to exert downwards pressure on prices over the outlook period. Rice prices, in particular, are projected to decline by 0.8% p.a. in real terms, as productivity gains in major Asian importing countries like Indonesia are expected to reduce global import growth.

Prices for soybean and other oilseeds are projected to remain essentially at their current levels as productivity growth is expected to keep pace with growing demand over the coming decade. Compared to the last decade, demand growth for vegetable oil is slowing down considerably, as consumption in many emerging economies (including China, Brazil, and South Africa) is reaching saturation level; as a result, a small decrease in real prices is projected. For protein meals, a modest increase in real prices (0.15% p.a.) is expected due to low starting prices in 2019, as Chinese feed demand was considerably reduced due to the ASF outbreak.

With a return to a more balanced market (after a large production deficit in 2019), nominal sugar prices are expected to increase but should remain broadly flat in real terms with a slowdown in demand growth in regions where per capita consumption is already high.

There is no real international milk price, as unprocessed milk is practically not traded. The two main reference prices for dairy products are international prices for butter and skimmed milk powder (SMP), which can been seen as proxies for the price of milk fat and milk solid, respectively. SMP prices recovered following the complete disposal of the European Union's intervention stocks in 2019, and are expected to remain constant in real terms throughout the outlook period. Annual butter prices peaked in 2017, and have declined since then. Over the coming decade, butter prices are projected to continue to decrease slightly in real terms, which will contribute to further narrow the price gap between SMP and butter. World prices for whole milk powder (WMP) and cheese reflect butter and SMP price developments, in line with the respective content of fat and non-fat solids.

Real fish prices are expected to remain largely unchanged over the next ten years, with small increases in the first part of the outlook period followed by a decline in the second half as production grows faster, particularly in China.

For biofuels, ethanol prices are projected to increase slightly in real terms, as they are currently at very low levels, while biodiesel prices are expected to decrease by about 0.6% p.a. over the next ten years. The evolution of biofuels markets is heavily dependent on the evolution of crude oil prices (which are mostly constant in real terms) and policy decisions, but also on the prices of feedstock, e.g. vegetable oils for biodiesel and maize and sugar crops for ethanol. The modest evolutions in prices for these feedstock over the coming decade will contribute to the relatively flat price evolutions for biofuels.

International cotton prices are expected to continue to decrease in real terms throughout the projection period, as world cotton demand remains under pressure from synthetic fibres, notably polyester. However, the price ratio between cotton and polyester is expected to stabilise.

Lower agricultural commodity price benefit millions of consumers worldwide, as it improves affordability and hence access to food. However low prices can also put pressure on the income of producers who are not lowering their costs sufficiently through improved productivity. A low-price environment could thus lead to increasing demand for support to farmers, which could in turn affect the projections. Moreover, low agricultural prices reduce incentives for farmers to invest in technologies that may allow further yield gains in the future, which could limit supply expansion over the coming decades.

Overall, the continued demand for agricultural commodities is projected to be met by efficiency gains in production, which will keep real agricultural prices relatively flat. However, periodic shocks will affect commodity prices over the outlook period creating temporary periods of rising prices and higher volatility. The magnitude of such shocks has been declining over time due to improvement in the resilience of production systems, and access to global trade. However, climate change, could increase the likelihood of extreme weather events (e.g. drought, flooding), which could lead to stronger variations around the trend.

1.6. Risks and uncertainties

The baseline projection is a plausible scenario based on specific assumptions regarding population and other demographic trends, macroeconomic conditions, productivity trends, consumer preferences, agricultural and trade policies and weather conditions. While it is based on the best information available at the time, it is inevitable that there should be a degree of uncertainty attached to projections of demand, and supply that extend ten years into the future and also to the underlying assumptions on which the projections are based. The occurrence of some changes to exogenous conditions may be predicted – conclusion of some trade negotiations, for example – although the magnitude and dynamics of their effects may not. Others may be entirely unpredicted or inherently unpredictable events such as some pests or diseases or weather shocks. These uncertainties surrounding the projections of demand and supply are discussed below in this final section.

Impact of the COVID-19 pandemic

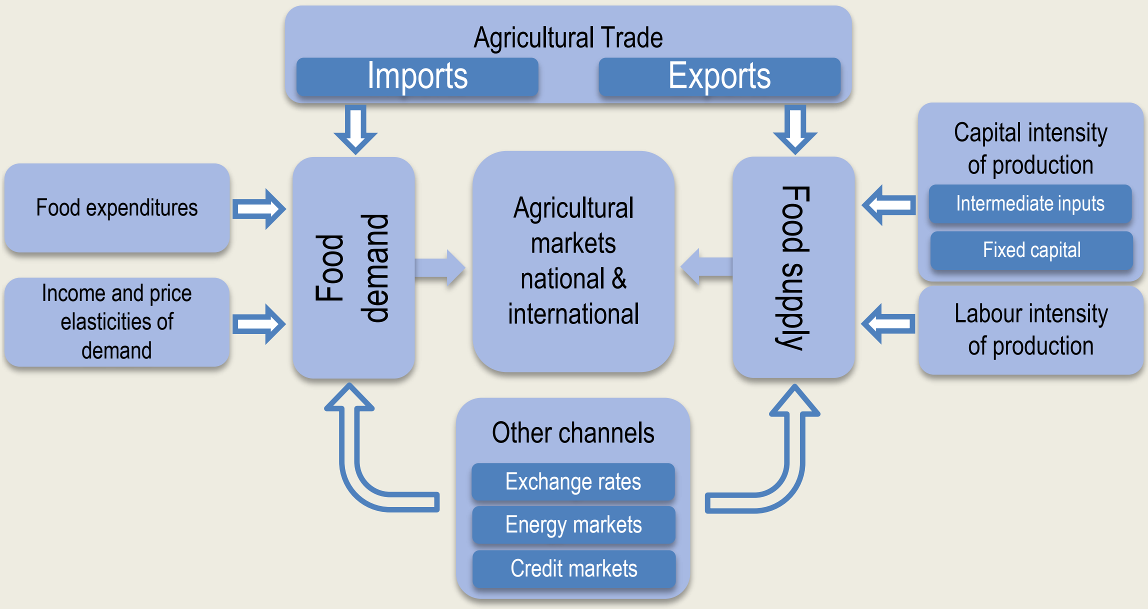
The most significant immediate uncertainties obviously relate to the COVID-19 pandemic which impacts on all of consumption, production and trade. The channels of transmission are summarised in Box 1.3. This current edition of the *Outlook* was already being finalised when the COVID-19 pandemic began. Its full impacts on agricultural and fish markets remain uncertain, at least in quantitative terms, and were therefore not incorporated into the baseline projections. However, they are the subject of an initial analysis in a special scenario exploring the implications of the macroeconomic impacts of the pandemic, which is presented below. Disruption of primary agricultural production could be limited for most of the commodities covered in the *Outlook*, especially crops, and at least in the major producing and trading countries. However, interruptions to downstream food processing, trade, forced adjustments of consumer demand, and shortages of seasonal labour will all have some impact on agricultural and fish markets, especially in the short term.

Box 1.3. COVID-19: Channels of transmission to food and agriculture

The general consensus in April 2020 regarding the impacts of COVID-19 anticipated a contraction in both supply and demand of agricultural products and pointed to possible disruptions in trade and logistics. They will affect all elements of the food system, from primary supply, to processing, to trade and national and international logistics systems, to intermediate and final demand. It also affects factor markets, namely labour and capital, and intermediate inputs of production (e.g. pesticides, seeds). The magnitude of these effects will depend upon the persistence and spread of the pandemic itself and the dynamics of economic adjustments and recovery. On the supply side, widely different views remained on the duration of the shocks, the price dynamics, differential impacts between domestic and international markets, differences across countries and commodities, the timing and likely paths of recovery and the policy actions to remedy the various shock waves. On the demand side, there was a near ubiquitous agreement that agricultural demand and trade would slow-down, with contractions stemming from a deceleration in overall economic activity (GDP growth) and rising rates of unemployment. Social distancing measures will restrict access to foods, notably those typically consumed out of the home. Food and agricultural systems are exposed to both demand and supply side shocks (symmetric), but these shocks are not expected to take place in parallel (asynchronous) as consumers can draw on savings, food stocks and safety nets to supplement their income devoted to food purchases.

The channels of transmission into food and agricultural demand include numerous macroeconomic factors, notably swings in exchange rates, in energy and credit markets, and, most importantly, the expected surge in unemployment and the contractions in overall economic activity. The impacts of the pandemic will be felt differently depending on the type of industry and the stage of development of a country. In general, agriculture in high-income countries is a capital-intensive industry, exposed to possible disruptions of supplies of intermediate inputs in the short term and fixed capital items in the longer term. The same holds for some agricultural systems in low-income countries, but their exposure to a pandemic shock can differ markedly. For instance, while export-oriented farmers in North America may benefit from lower interest rates but suffer from an appreciation of their currency, similar producers in South America may experience the opposite impacts.

Figure 1.32. COVID-19: Channels of transmission to food and agriculture



Source: J. Schmidhuber, J. Pound & B. Qiao (2020), *COVID-19: Channels of transmission to food and agriculture*, FAO Publications, Rome, https://doi.org/10.4060/ca8430en.

Lack of inputs affects a growing number of farmers around the world. Low supplies of pesticides for instance is already affecting crop protection efforts in countries affected at an early stage and will likely reduce yields later in the year. A lack of pesticides is also hampering efforts to contain pest outbreaks, including the current locust outbreak in East Africa.

Labour availability for agricultural supply chains has become a near global problem. In general, low-income countries employ higher shares of labour for primary production, which makes them more exposed to direct disruptions in labour supply. Such deficits can be caused by domestic labour supply disruptions, as well as by shortages of seasonal and migrant workers.

In addition, macroeconomic channels of transmission affect agricultural supply, trade and final demand. The precipitous fall in oil and metal prices, for instance, exerted downward pressure on the exchange rates of many commodity-exporting countries (“commodity currencies”). The downward pressure on exchange rates, triggered by price declines in non-food commodities, affects all tradeable commodities, including food. It makes food supplies internationally more competitive, at least in the short term, raising concerns in some countries about potential shortages in domestic supplies. Globally, carry-over stocks are high, the prospects for the next crop are good and food demand is likely to stagnate or even decline given the expected global recession, while biofuel demand is likely to be capped in view of the sharply lower crude oil prices. Still, the extent of a possible demand contraction is unclear. In the case of a substantial global GDP contraction, low-income countries may experience food security challenges due to lower incomes, rather than increased prices.

Finally, and arguably most importantly, COVID-19 will exert a shock on final food demand by lowering overall purchasing power, especially for an increasing number of unemployed people. The actual impact on food demand will depend on numerous factors, including the depth and length of the macroeconomic shock, the availability of savings and access to credit and safety-net mechanisms. While neither the final income nor the final price impacts are clear at this early stage, the availability of food staples and the greater exposure of labour intensive foods such as vegetables and dairy products to adverse effects emanating from this pandemic, suggests a deterioration in the quality of the diets rather than increases in calorie deficits.

Source: (Schmidhuber, Pound and Qiao, 2020[24])

The baseline projections in the *Outlook* represent a consensus among the secretariats of OECD and FAO as well as collaborating institutions about the future trends in global agriculture. The projections cycle began at the end of 2019 and the baseline was subsequently prepared on the basis of a set of demographic and macro-economic assumptions that reflect the global economic outlook at the time. Shortly after, the COVID-19 outbreak was declared a pandemic, significantly disrupting all sectors of the economy. However, the precise effects of this pandemic on agricultural and fish markets remained uncertain, at least in quantitative terms, and were therefore not incorporated in the baseline projections.

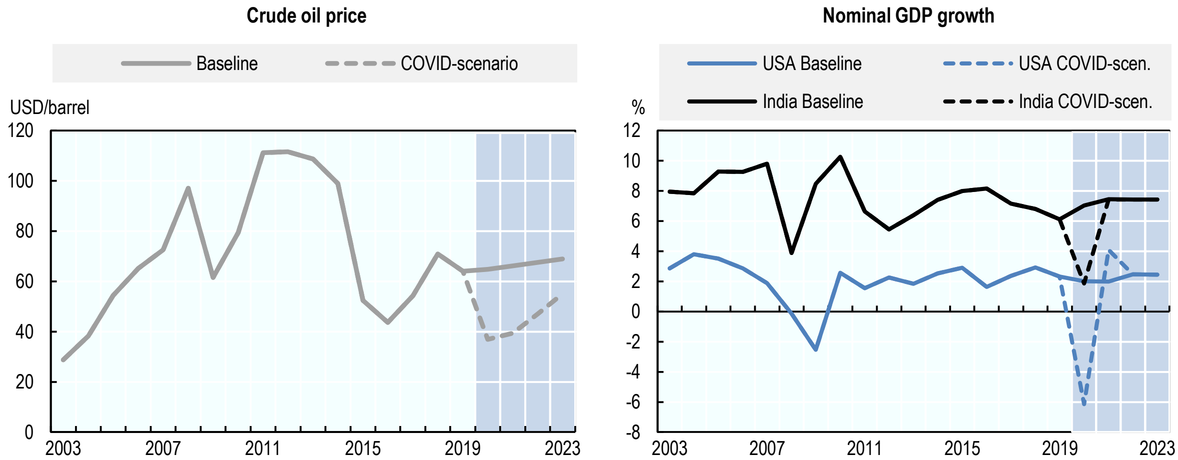
The Aglink-Cosimo simulation model underlying the baseline projections of the *Outlook* offers the possibility to conduct scenario analyses to explore the impact of alternative sets of assumptions on future developments of global agricultural markets. These capabilities are used to simulate possible impacts of the COVID-19 pandemic on agricultural markets over the short term.

This scenario focuses on the potential macroeconomic impacts of the pandemic rather than focusing on the short-term disruptions related to the restrictions of movement of people and disruption to transport and logistics. The scenario uses projections from the *World Economic Outlook* of the International Monetary Fund (IMF) for GDP growth, inflation and the world crude oil price for the next two years. According to the IMF projections, the global economy will contract by 3% in 2020, which is a larger GDP decline than experienced during the 2008–09 financial crisis. It is then assumed that the pandemic will fade in the second half of 2020, and that containment measures will be gradually relaxed allowing the global economy to grow by 5.8% in 2021, as economic activities normalize. For the remaining years of the outlook period, the baseline growth rates for macroeconomic variables (i.e. GDP growth, inflation) are applied to the revised 2021 values.

Additionally, the average crude oil price is projected to be USD 37/barrel in 2020 and USD 40/barrel in 2021, down from USD 64/barrel in 2019. Thereafter, the crude oil price recovers to the baseline values in 2025 and remains as in the baseline for the final years of the projection period. Figure 1.33 illustrates some of the scenario assumptions relative to the macroeconomic assumptions underlying the baseline.

The macroeconomic shocks induced by the COVID-19 pandemic are expected to put downward pressure on agricultural commodity prices. The contraction in economic activity is projected to weaken global demand for agricultural commodities. Supply-side reaction to this reduction in demand will be delayed as production decisions (e.g. sowing of crops) were made prior to the onset of the COVID-19 pandemic, leading to an oversupply of many agricultural commodities in the short run. In response, stocks of agricultural commodities are expected to increase, causing commodity prices to fall further until normal levels of consumer demand resume. In addition, the drop in oil prices will reduce agricultural production costs in the first years of the projection period (e.g. lower fuel and fertilizer costs). All these factors will contribute to lower agricultural commodity prices in this scenario compared to those projected in the *Outlook* for the first years of the projection period.

Figure 1.33. COVID-19 scenario macro assumption



OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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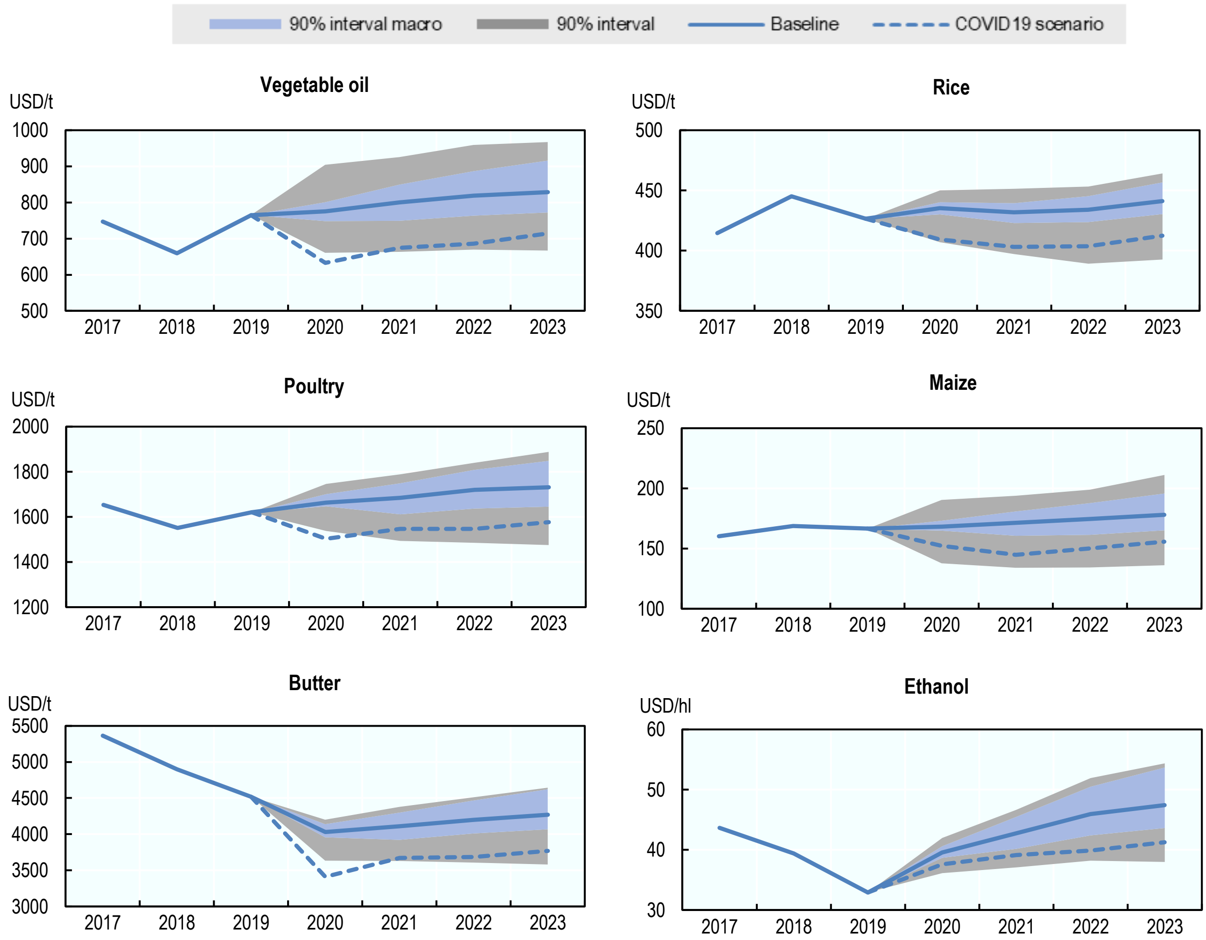
Figure 1.34 shows the expected evolution of nominal prices for selected commodities under the baseline scenario of the *Outlook* (solid line) and under the COVID-19 scenario (dashed line) in relation to the stochastic outcomes. To assess the uncertainty around the projected prices, two sets of partial stochastic analysis were performed on the projections of the *Outlook*. The first stochastic analysis simulates the potential variability of agricultural markets using 1 000 different scenarios based on historic variations from their long-run trend for macroeconomic (GDP growth, inflation) and other variables, such as oil prices, exchange rates and yield shocks (grey fan). The second one only varies macroeconomic variables (GDP growth and inflation) and the crude oil price (blue fan for 90% confidence interval). Consequently, more extreme shocks than those observed in the past are not incorporated in the stochastic analysis. Moreover, the analysis is partial as not all sources of variability affecting agricultural markets can be captured. For example, animal diseases such as African Swine Fever can have important effects on markets but are not included here. Nevertheless, the results of the partial stochastic analysis give an indication of the sensitivity of the projections to some of the most important sources of variability in agricultural markets.

The lower economic growth path in the COVID scenario leads to a reduced growth in demand for agricultural commodities. In 2020, prices in the COVID scenario fall below the 90% macro confidence interval (blue fan) and prices for higher value commodities (e.g. vegetable oil, poultry and butter) even fall lower than during 90% of all previously conceivable disasters (grey interval); indicating that the COVID-19 pandemic is expected to create a historically significant market shock. Based on the assumed economic recovery beginning in 2021, prices gradually return to the baseline scenario over the following years.

The projected food demand is determined by two main drivers: lower economic growth reduces food demand whereas lower commodity prices support demand. The outcome differs among agricultural products and countries. The consumption of staple food like roots and tubers, rice and wheat is less affected under the COVID scenario. The impact on the food consumption for vegetable oil and animal products is considerably higher. As can be seen on Figure 1.35, the impact on least developed countries (LDCs) is considerably higher than the impact on the world average. For certain combinations of products and countries, the food consumption even increases as lower prices outweigh lower economic growth. Overall, the medium-term impact on average food consumption is not projected to be particularly strong, but LDCs appear to be more at risk and the impact will be even larger for the poorest segments of the population.

Figure 1.34. First years' evolution of nominal prices for selected commodities

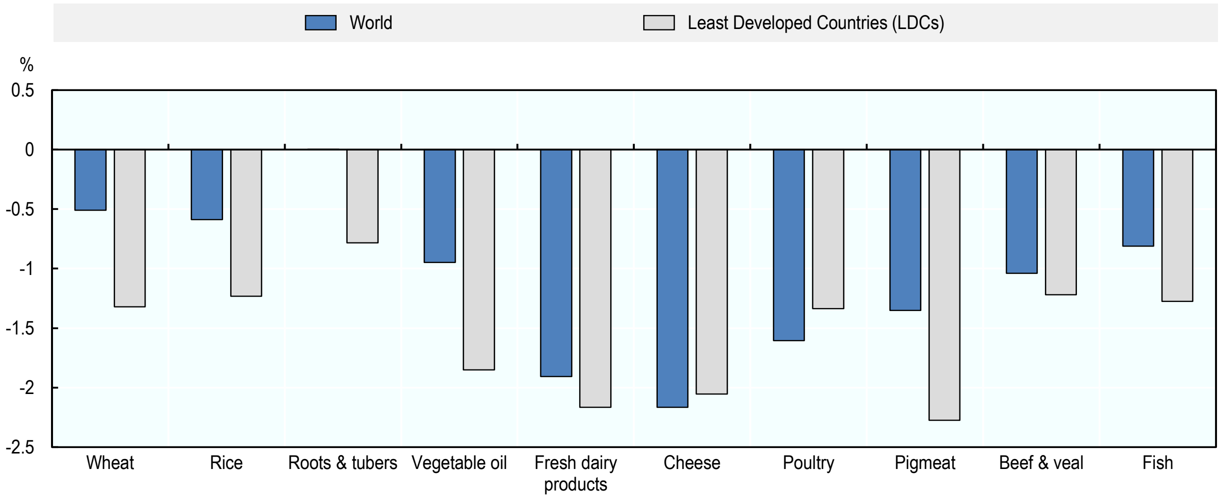


Note: Expected evolution of nominal prices under the baseline scenario of the *Outlook* (solid line) and under the COVID-scenario (dashed line) in relation to the stochastic outcomes shown in the grey (macro and yields) and blue (macro) 90% confidence intervals.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141646

This initial COVID-19 scenario provides some preliminary insights into the short-term impacts of the current pandemic on agricultural markets and, in particular, on agricultural prices and food demand. However, the economic, social and political fallout of the pandemic is evolving in extremely complex patterns. Additional aspects would need to be assessed in order to provide a more complete picture of the effect of the pandemic. These include structural changes to food demand, policy measures affecting national and global food chains, and the depth and length of the macroeconomic shock and the recovery path. Another limitation of this scenario analysis is the absence of feedback loops, including those on other sectors of the economy, on households and government (e.g. lower commodity prices could reduce income, lower prices reduce investment, new policy measures could affect outcome).

Figure 1.35. Food consumption in 2020/21 (COVID-19 scenario vs. baseline)



OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Other uncertainties to the projections

Demand

On the demand side, one main source of uncertainty relates to the likely evolution of consumer preferences. Overall, consumers’ purchasing decisions are increasingly driven by factors beyond prices and taste, such as health and environmental concerns. One key expression of this trend is the surge in vegetarian, vegan or “flexitarian” lifestyles in high-income countries, and in particular among the young. Currently, vegetarians, vegans and related categories are estimated to account for less than 10% of the global population, but if adopted by an increasing share of the population, these diets could affect global markets, in particular for meat and dairy products, by fostering a shift away from animal proteins towards plant (or insect) proteins. Overall, these trends tend to be relatively slow moving and are hard to assess. Any alternative assumption about the evolution of consumer preferences than the one made in this *Outlook*, such as wider spread of vegetarians, vegan or “flexitarian” lifestyles, would alter the medium term projection trend. Food health scares, by contrast, have the potential of reducing consumer demand in the short run, sometimes with lasting consequences. These are not considered in the *Outlook* but would lead to fluctuations around the food consumption projections.

Moreover, growing consumers’ expectations for sustainable farming practices along with environmental, ethical and animal welfare concerns could influence the level but also the composition of feed demand over the coming decades. This could stimulate demand for locally produced and/or feed that is not genetically modified, including pulses and other legumes, and reduce demand for soybean, especially in the high-income countries of Europe.

The *Outlook* holds policies fixed in the medium term and makes assumptions about their future effectiveness, which also constitutes a source of uncertainty. For instance, policy measures introduced to reduce overall calorie consumption or to foster a shift towards healthier diets (e.g. sugar tax, labelling schemes, product reformulation) could affect both the overall demand for food as well as the relative demand for different food products in ways that are unforeseen today. Similarly, policies that aim to encourage consumers to adopt more sustainable/lower emissions diets (e.g. consumer taxes on emission intensive products) or to reduce food waste, could also affect consumption patterns.

The assessment of the effectiveness of biofuel polices also remains uncertain. In January 2020, for example, the Indonesian government introduced the B30 programme nationwide to reduce its dependence on imported fossil fuels. The *Outlook* assumes that Indonesia will successfully implement the programme and that the biodiesel blending rate will remain at around 30% over the projection period. However, reaching the intended target will largely depend on the government support policy for biodiesel producers, which relies on the relationship between domestic and international palm oil prices. Higher production costs driven by higher palm oil prices and engine durability could jeopardise these targets. The evolution of biofuel markets is also heavily dependent on the evolution of crude oil prices. Current low international oil prices – a result of weak global demand resulting mainly from the COVID-19 pandemic – are reducing demand for crops for biofuels. An economic recession due to COVID-19 could further decrease global transportation fuels and biofuel demand.

Supply

The production of agricultural commodities is uniquely vulnerable to natural conditions, including weather and different plant and animal diseases. The African Swine Fever (ASF) outbreak is one example. In August 2018, China reported its first case. The disease subsequently spread to other countries in East Asia (e.g. Viet Nam), and has re-emerged in Europe. In 2019, pork production in China and Viet Nam – the two largest pork producers in the world – declined by 21% and 17%, respectively. Measures put in place to contain the outbreak (e.g. subsidies for culling herd) are expected to continue to depress global pork production in the next three years. Starting from 2021, however, the *Outlook* assumes that global pigmeat production will increase again and reach pre-ASF production levels by 2025. However, as the success of these policies is uncertain, the medium term impact of the epidemic may be more severe than currently anticipated. Moreover, the drop in pork production in Asia also creates uncertainty around projections for import demand of different meats and for global demand for animal feed.

One major pest outbreak affecting crops is desert locust swarms that consume crops, pasture, forage and any other green vegetation. According to the FAO, a swarm of one square kilometre can eat in one day the same amount of food as 35 000 people. In February 2020, eight East African countries suffered the worst locust outbreak in decades, with tens of thousands of hectares of croplands and pasture being damaged in Ethiopia, Kenya and Somalia. Moreover, heavy rains in late March established favourable breeding conditions that will allow for a second, and potentially larger, wave of desert locus infestation in the Horn of Africa, but also in eastern Yemen and southern Iran. In May, the eggs will hatch into hopper bands that will form new swarms in late June and July, coinciding with the start of the harvest and posing an unprecedented threat to food security and farmers' livelihoods in the region (FAO, 2020[25]). Moreover, lockdown measures as a result of COVID-19 have slowed ground and aerial control operations to fight the infestation, as crossing borders has become difficult and pesticide deliveries are delayed (Okiror, 2020[26]).

Extreme climate events such as heat waves, droughts, and heavy rainfall have a strong impact on agricultural production, particularly on crop output. Supply and demand projections in the *Outlook* are based on the assumption that weather conditions continue to follow their established patterns throughout the projection period. However, climate change may slowly shift climatic conditions and increase the likelihood of adverse weather events in the coming decades. If no appropriate adaptation measures are implemented, this could negatively impact crop and animal yields in most regions, and give rise to more volatile food supplies and prices. Any alternative assumption about agro-climatic and weather conditions than the one made in the *Outlook* would alter the medium term projection trend.

Policies and regulations allowing the development and adoption of new technologies such as new plant breeding techniques or digital technologies, on the other hand, could result in higher productivity gains than the one projected by the *Outlook*. The projected trends in crop and animal productivity in the *Outlook* assume continued improvements to the genetic potential of crops and farm animals and ongoing innovations in the production technology, which in turn depend on continued public and private investment in research and development (R&D). Since the 2008-09 financial crisis, public R&D spending has fallen in high-income countries although it has been growing in a number of emerging economies, including India and China. Moreover, global private-sector R&D investments have been growing faster than public R&D spending in recent years. These trends support the assumptions of continuing productivity growth in this Outlook, but any alternative scenario with respect to the assumed rate of progress would alter the projections of yield and production growth.

Over the coming decade, agricultural production will also be shaped by a wide range of policy measures that aim to reorient, adjust or restrict production practices. These measures pursue various objectives, such as limiting contributions to or adapting to climate change, ensuring animal welfare and human health, increasing domestic self-sufficiency or meeting export targets. While the *Outlook* has incorporated expectations on the impact of all known measures, their actual outcomes are uncertain, and policy change could intervene before the end of the projection period.

International trade

The nature and volume of international trade flows in agricultural and fish products are influenced by bilateral trade relations and a variety of regional trade arrangements. The ongoing trade tension between the United States and China continues to create uncertainty around the projections in the *Outlook*. Since April 2018, China has been imposing retaliatory tariffs of 25% or more on nearly all US agricultural commodities, leading to a fall in US agricultural exports to China from USD 19 billion in 2017 to USD 9 billion in 2018, and exports have remained depressed in 2019 (Congressional Research Service, 2019[27]). On 15 January 2020, however, the United States and China signed the Phase One Agreement, which includes commitments by China to increase purchases of US agricultural commodities. In particular, it targets increasing China's agricultural imports from the United-States by USD 12.5 billion in 2020 and by USD 19.5 billion in 2021, compared to 2017 values (Lighthizer and Mnuchin, 2020[28]). However, the agreement does not discuss tariff levels or specify an end date for the Chinese tariffs. The *Outlook* therefore assumes that tariffs between the United-States and China will remain at current levels over the projection period but that other measures, beyond tariffs, will be taken to enhance trade between the two countries. In particular, the *Outlook* assumes that China's tariff rate quotas (TRQs) for maize, rice and wheat will be filled at a higher rate after a short transition period. The implementation of the Phase One Deal, and any further negotiated resolution to this dispute, are likely to have a significant impact on world markets of agricultural commodities, redirecting agricultural trade flows and impacting global prices as well as the market share of other countries. This is particularly likely for soybean given the importance of China and the United States in the global soybean market.

On 1 February 2020, the United Kingdom officially left the European Union, a process commonly refer to as Brexit. During the preparation of the *Agricultural Outlook*, the European Union and the United Kingdom had just started negotiations to determine future trade rules (e.g. custom duties, standards, quotas) that will apply after the transition period.[3] Hence, the *Outlook* reports the United Kingdom separately from the rest of the European Union but assumes no disruption to trading relations. However, the impact of Brexit could be substantial, since the United Kingdom has a strong trading relationship with the European Union: in 2018, more than 70% of the country's agricultural imports came from the European Union and 62% of the country's agricultural exports went to the European Union. Overall, the United Kingdom is a net importer of agricultural products, and in 2018 it had an annual agri-food trade deficit of USD 27 billion with the rest of the European Union. While trade between EU Member States is tariff free, Brexit could result in higher trade barriers, which would affect agricultural prices and production in the United Kingdom and the European Union. Furthermore, the UK farming sector receives on average 60% of farm incomes from the EU Common Agricultural Policy (CAP) subsidies. Even though the UK government is committed to maintaining these subsidies in 2020, the proposed refocus of support could affect domestic production and prices. Brexit may have a global impact on markets for cheese, butter, pork and sheep meat, commodities for which the United Kingdom is a large net importer. For other markets, the main effect may be a reallocation of trade flows to other trade partners with less impact on overall numbers.

The African Continental Free Trade Agreement (AfCFTA) officially came into force in May 2019 and has already been ratified by 29 countries. The agreement will effectively consolidate 55 African countries into a single market, which will have a combined population of more than 1.3 billion people and a combined GDP of USD 2.26 trillion. By July 2020, when trade under the agreement is scheduled to commence, 90% of the products traded within the region will be duty free, while duties for an additional 7% of products will be phased out over the next decade. The elimination of tariffs on agricultural commodities offers significant opportunities for an expansion in intra-Africa trade and improvements in market efficiency. However, non-tariffs barriers to trade, including the poor quality of transport infrastructure, may challenge the implementation of this free trade area and limit market integration. Africa's logistics challenges also include long and bureaucratic customs procedures, corruption at borders, and security issues that can further hamper the transportations of goods between countries (Berahab and Dadush, 2018[29]).

On 28 June 2019, the European Union and Mercosur states (i.e. Argentina, Brazil Paraguay and Uruguay) announced the conclusion of the negotiations of the EU-Mercosur trade agreement although a full implementation of the agreement may take up to three years. The European Union has already signed a wide range of agreements governing its trade relations with most of the sub-regional groups and individual countries of the Americas but the EU-Mercosur agreement has the potential to become the European Union's most important trade agreement, several times larger than the one between the European Union and Canada (CETA). Market access for agricultural goods will be liberalized significantly. Mercosur duties will be gradually eliminated over the next ten years on 93% of tariff lines, with a longer liberalization of up to 15 years for some sensitive products. In parallel, the European Union will liberalise 82% of its agricultural imports. Tariff-rate quotas (TRQs) will be applied for some EU sensitive products such as beef, poultry, pigmeat, sugar, ethanol, rice, honey and sweetcorn. Further reciprocal TRQs will be opened by both sides and cover imports of cheese, milk powders and infant formula. Mercosur countries stand to benefit from lower EU tariffs and hence higher exports of meat products, fruit, orange juice, sugar and ethanol. The European Union, in turn, could benefit from higher exports of dairy products, pigmeat, wine and spirits. By contrast, some sensitive EU products such as beef, rice, poultry and sugar might see greater competition from Mercosur suppliers and increased downward pressure on prices. France, Ireland and Belgium are likely to be the most exposed to higher competition, notably in the beef market.

Box 1.4. Macroeconomic and policy assumptions

The main assumptions underlying the baseline projection

This *Outlook* presents a scenario that is considered plausible given the assumptions made on the macro-economic, policy and demographic environment. These assumptions underpin the projections for the evolution of demand and supply for agricultural and fish products. The main assumptions are highlighted in this box while detailed data are available in the Statistical Annex.

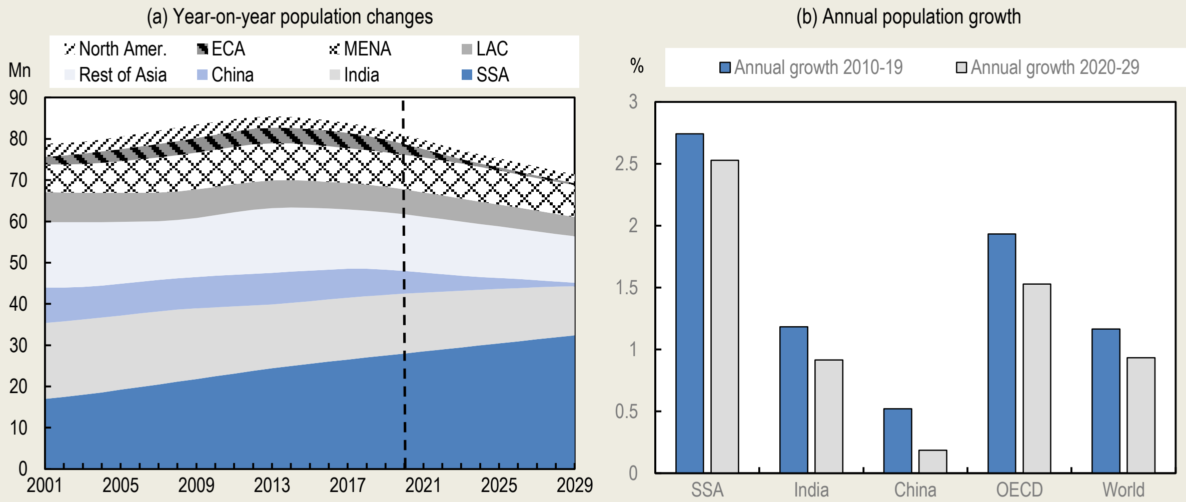
Population growth

The *Outlook* uses the UN Medium Variant set of estimates from the 2019 Revision of the United Nations Population Prospects database.

Over the projection period, world population will grow from an average of 7.6 billion people in 2017-19 to 8.4 billion people in 2029. This corresponds to an annual growth rate of 0.9%, a slowdown compared to the 1.2% p.a. growth rate experienced over the last decade. Population growth is concentrated in developing regions, particularly Sub-Saharan Africa, which is expected to have the fastest growth rate at

2.5% p.a., and India, where the population will grow by 0.9% p.a. With an additional 147 million people by 2029, India is expected to overtake China as the most populous country.

Figure 1.36. World population growth



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; ECA is Europe and Central Asia; MENA is Middle East and North Africa; Rest of Asia is Asia Pacific excluding China and India.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).
StatLink https://doi.org/10.1787/888934141684

Per capita income growth

Estimates of per capita income growth are taken from the *OECD Economic Outlook* No. 106 (November 2019) and the *IMF World Economic Outlook* (October 2019). They are expressed in purchasing-power parity terms, in constant 2011 US dollars.

One of the main determinants of food demand is household disposable income, which is approximated in this *Outlook* using growth in per capita GDP. As showed in the World Bank’s Poverty and Shared Prosperity 2018 report, however, the impact of economic growth, including on average food consumption, can be unevenly spread. In particular, in several Sub-Saharan African countries the incomes of the poorest 40% of the population have lagged average income growth. For this reason, demand projections in Sub-Saharan Africa in this *Outlook* can deviate from what might be expected based on average growth.

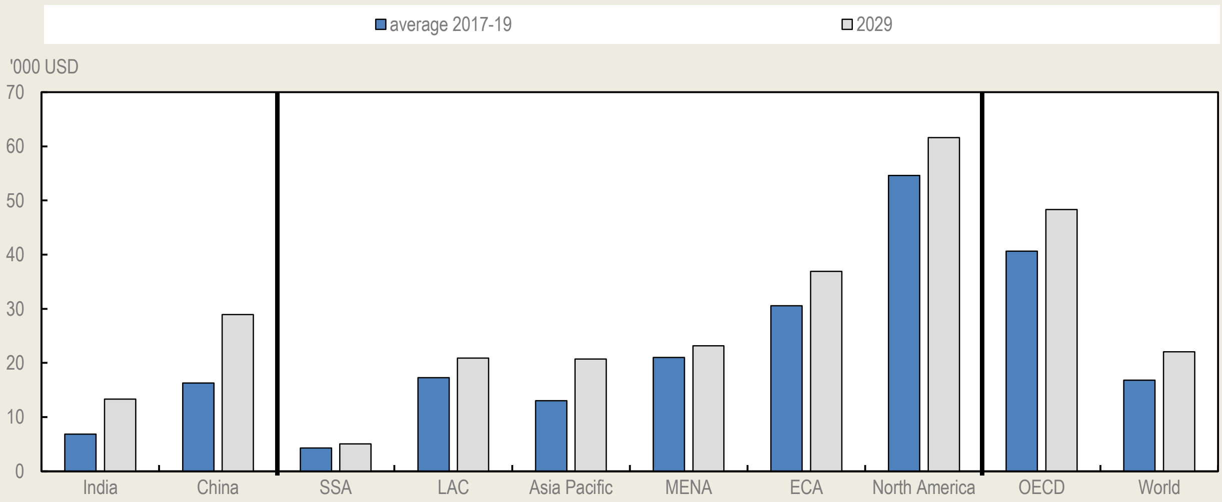
Over the projection period, global income per capita is expected to grow by 2.8% p.a. in real terms. In India, strong economic growth (6.3% p.a.) is expected to almost double per capita incomes over the projection period. Economic growth in China is expected to slow down over the coming decade, although per capita incomes will still grow by 78% (or 5.3% p.a.) over the next ten years. Other developing countries in Asia are projected to continue experiencing robust growth over the medium term. The growth of per capita incomes in Viet Nam, Indonesia, and the Philippines is projected to be in the 4-6% p.a. range, while in Thailand and Malaysia it is projected to be around 3.6% p.a.

Per capita income in least developed countries in Asia is expected to grow at an average of 5.8% over the next ten years, the second highest growth rate after India. In Pakistan, growth will be slightly slower at 3.2% p.a. Similarly, per capita income in countries in Central Asia is anticipated to grow at about 4.6% p.a. on average. In Sub-Saharan Africa, per capita incomes are projected to grow by 17.5% over the projection period, mainly due to high economic growth expected in Ethiopia at 6.6% p.a. In the Latin America and Caribbean region, per capita income growth varies considerably by country. While incomes in Brazil and

Mexico will grow relatively slowly in the next decade (i.e. below 2% p.a.), countries such as Peru and Paraguay will see per capita incomes grow by 2.8% p.a., and Colombia by 3.1% p.a. In the Middle East and North Africa, overall growth is negatively affected by the projected decline in per capita incomes in Syria and Libya over the next ten years. Egypt will experience the fastest growth in per capita incomes in the region, at 4.4% p.a.

In OECD countries, per capita income is projected to grow at around 1.7% p.a. over the coming decade. Higher growth is expected for Turkey and Korea at 2.9% p.a., while per capita incomes are expected to grow the slowest in Canada at 0.9% p.a.

Figure 1.37. Per capita income



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; ECA is Europe and Central Asia; MENA is Middle East and North Africa. The graph shows per capita GDP in purchasing-power parity (PPP) terms (constant 2011 US dollars).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

StatLink https://doi.org/ 10.1787/888934141703

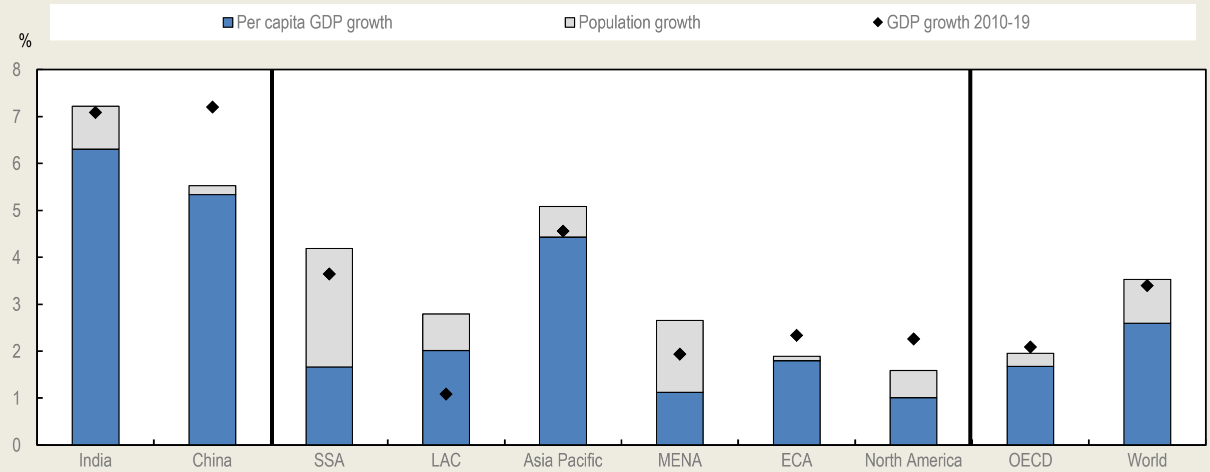
Global growth

GDP growth assumptions are based on the *OECD Economic Outlook* No. 106 (November 2019) and on the *IMF World Economic Outlook* (October 2019).

The global economy will grow at an average rate of 3.4% over the next ten years. Figure 1.38 shows growth rates of GDP for key regions, including those of the regional briefings of this year's *Outlook,* and for selected countries. Globally, the highest growth will be recorded in India, at 7.4% p.a. In Latin America, the fastest GDP growth will be seen in Paraguay at 4.0% p.a. Among South East Asia countries, Viet Nam and the Philippines will experience the highest growth at 6.5% p.a. In Sub-Saharan Africa, Ethiopia will dominate at 6.6% growth p.a. In the Middle East and North Africa, the strongest growth is expected in Egypt at 6% p.a., followed by Yemen, Morocco and Tunisia at around 4.2-4.9% p.a., while other countries of the region will experience more modest growth at around 2-3% p.a.

Figure 1.38 also decomposes the GDP growth assumptions into per capita GDP growth and population growth. Globally, economic growth will be mainly driven by per capita income growth; this is especially the case in OECD countries, in Europe and Central Asia and in China. By contrast, high population growth in Sub-Saharan Africa means that the relatively high rate of economic growth in the region (4.5% p.a.) corresponds to only a modest growth in per capita incomes (at around 1.7% p.a.).

Figure 1.38. Annual GDP growth rates 2020-2029



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; ECA is Europe and Central Asia; MENA is Middle East and North Africa.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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Exchange rates and inflation

Exchange rate assumptions are based on the *OECD Economic Outlook* No. 106 (November 2019) and on the *IMF World Economic Outlook* (October 2019). Real exchange rates for the period 2020-29 are assumed to be broadly stable, so that nominal exchange rates relative to the US dollar are mostly driven by differences in inflation compared to the United States. Some currencies are expected to appreciate in real terms compared to the US dollar; this is the case in particular for Argentina, but also to a lesser extent for Turkey, Japan, Mexico, New Zealand, Russian Federation, Paraguay and Uruguay. By contrast, a real depreciation is expected for Norway, Australia, Korea, the European Union, Brazil and China. In non-OECD countries, the highest real depreciation is expected in Ethiopia, Ukraine and South Africa.

Inflation projections are based on the private consumption expenditure (PCE) deflator from the *OECD Economic Outlook* No. 106 (November 2019) and on the *IMF World Economic Outlook* (October 2019). In the United States, an inflation rate of 2% p.a. is expected over the next ten years, and in the Euro zone the inflation rate is expected to be 1.7% p.a. over the same period. In other OECD countries, inflation rate is expected to average 3% p.a. Among the main emerging economies, consumer price inflation is projected to remain stable in China at around 3% p.a., and to decrease in Brazil to 3.5% p.a., compared to 6.8% p.a. in the previous decade. Similarly, consumer price inflation in India should decrease from an annual growth rate of 5.9% to 4% p.a. over the next ten years. Argentina's inflation growth rate will remain very high but is expected to decrease annually compared to the last decade, from 28.1% p.a. to 18.8% p.a.

The Euro is expected to appreciate relative to the US dollar in nominal terms. The currencies of Japan, Canada, Korea, and New Zealand are also expected to appreciate nominally. In contrast, strong depreciations are projected for Argentina, Turkey and Nigeria and to a lesser extent for Ethiopia, Egypt, South Africa, Brazil, India, and the Russian Federation.

Input costs

The projections in the *Outlook* are based on assumptions about agricultural production costs, which include costs of seed, energy, fertilisers, and various tradable and non-tradable inputs. The projections are guided by the evolution of a composite cost index based on these input costs and constructed using historical cost shares for each country and commodity (held constant for the duration of the outlook period). Energy costs are represented by the international crude oil price expressed in domestic currency. The evolution of costs of tradable inputs such as machinery and chemicals is approximated by the development of the real exchange rate, while the evolution of costs of non-tradable inputs (mainly labour costs) are approximated by the evolution of the GDP deflator. The evolution of seed and fertiliser prices is approximated in an iterative way, as these input costs depend in part on crop prices and, in the case of fertiliser, on crude oil prices.

Historical data for world oil prices for 2018 are based on Brent crude oil prices obtained from the short-term update of the *OECD Economic Outlook* N°106 (November 2019). For 2019, the annual average monthly spot price in 2019 was used, while the estimate for 2020 is based on the average of daily spot prices in December 2019. For the remainder of the projection period, oil prices are assumed to remain flat in real terms, which implies an increase in nominal terms from USD 65/barrel at the end of 2019 to USD 78/barrel in 2029.

Policy considerations

Policies play an important role in agricultural, biofuel and fisheries markets, with policy reforms often changing the structure of markets. This *Outlook* assumes that policies currently in effect will remain as they are throughout the projection period.

The United Kingdom officially left the European Union on 1 February 2020. The United Kingdom is reported separately from the rest on the European Union in this report; however, the projections assume no disruption to trading relationships between the United Kingdom and the European Union.

The *Outlook* assumes that tariffs between the United States and China will remain at current levels but that other measures, beyond tariffs, will be taken to enhance trade between the two countries. In particular, the *Outlook* assumes that China's tariff rate quotas (TRQs) for maize, rice and wheat will be filled at a higher rate after a short transition period.

The African Continental Free Trade Agreement (AfCFTA) officially came into force in May 2019. The agreement will effectively consolidate 55 territories into a single market, which will have a combined population of more than 1.3 billion people and a combined GDP of USD 2.26 trillion. By July 2020, when trade under the agreement is scheduled to commence, 90% of products traded within the region will be duty free, while duties for an additional 7% of products will be phased out over the next decade.

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Notes

[1] Feed in Figure 1.5 is calculated as “maintenance ration”, which is the amount of feed an animal needs to maintain its metabolism without gaining or losing weight, producing milk, or laying eggs. About 25% of the total feed energy is recovered as livestock products and counted as food. Similarly, biofuel shares reflect the energy in ethanol and biodiesel, while Dried Distillers Grain (DDG) is included in feed.

[2] Analysis of the current market situation and outlook for global production, consumption and trade of bananas and tropical fruits is presented in Chapter 11 on other products.

[3] The Withdrawal Agreement provides for a transition period from the 1 February 2020 until the 31 December 2020 during which the United Kingdom will maintain access to the internal market and the Customs Union. This transition period may be extended by one or two years. If negotiations are not concluded at the end of the transition period, it may end without agreement on future trade relations, and WTO rules would then apply.

2. Regional briefs

This chapter describes key trends and emerging issues facing the agricultural sector in the six FAO regions, i.e. Asia and Pacific, Sub-Saharan Africa, Near East and North Africa, Europe and Central Asia, North America, and Latin America and the Caribbean. For each region, it provides background on key regional characteristics (e.g. population, per capita income, agro-ecological conditions and natural resources endowment) and highlights medium-terms projections for production, consumption, and trade for the period 2020-29.

2.1. Introduction

Since the 2013 edition, the feature chapter of the *Outlook* has focused on the prospects of a specific country or region. Rather than a specific focus this year, this chapter provides broad highlights for the regions which are defined by the FAO in the implementation of its global work plan. These regions are highly diverse and the intention of these briefs is not to compare the regions, but to coalesce the main messages of the *Outlook* into the trends and emerging issues which are evident in them. The focus of the assessment is primarily on the end point of the *Outlook's* projection (2029) compared to the base period of 2017-19. These briefs do not include a quantitative assessment of the COVID-19 pandemic as presented in the Overview. These will be assessed as more information becomes available. However, the trends and issues presented in this chapter are those which are expected to underlie the *Outlook* as conditions gradually re-emerge from the unexpected "shock" of the spread of the novel corona virus, assuming that its effects on food production, consumption and trade will gradually moderate. The current projection is anticipated to remain a basis for the assessment of how the shock will impact across the regions in the next decade.

This chapter proceeds in six sections, with text, tabular and graphic information for each region following a similar template, with each of the regions presented sequentially. A background section provides the key regional characteristics and provides the setting from which the projection is described in the subsequent sections for production, consumption and trade. A templated annex to each regional brief provides common charts and tables outlining the key aspects of the projection for the region.

2.2. Regional outlook: Asia and Pacific

Background

The Asia and Pacific region[1] is as diverse as it is large compared to the other regions. Economies range from least developed countries such as Bangladesh to high income countries such as Japan. With 4.1 billion people, the region has more than half the world's population. However, it has only about 30% of agricultural land and while its natural resources are significant, the pressures on its resource base are increasing. The region is rapidly urbanising, largely due to rapid change in the People's Republic of China (hereafter "China"), but it is advancing rapidly in all countries. About 48% of people live in urban settings, but urbanisation is anticipated to rise to 54% by 2029. The region's population will grow at a rate of 0.7% p.a., an increase by 324 million with 445 million moving to urban locations.

Developing countries in the region are among the fastest growing, with average per capita incomes in the region anticipated to grow at almost 5% p.a. over the next decade, China, India and Viet Nam are projected to grow 5-6% p.a., and Thailand and Indonesia at around 3% p.a. The share of primary agriculture and fish value added in the economy is currently about 6% and has been declining. Rapid economic growth has also reduced the share of food in household expenditures to around 15% in 2017-19 implying considerable impact of prices and incomes on consumers[2].

There are major uncertainties in the outlook for the region. Ongoing trade conflicts have not been fully resolved. The incidences of African Swine Fever (ASF) in China and parts of Southeast Asia have critically impacted pig-meat production.

Production

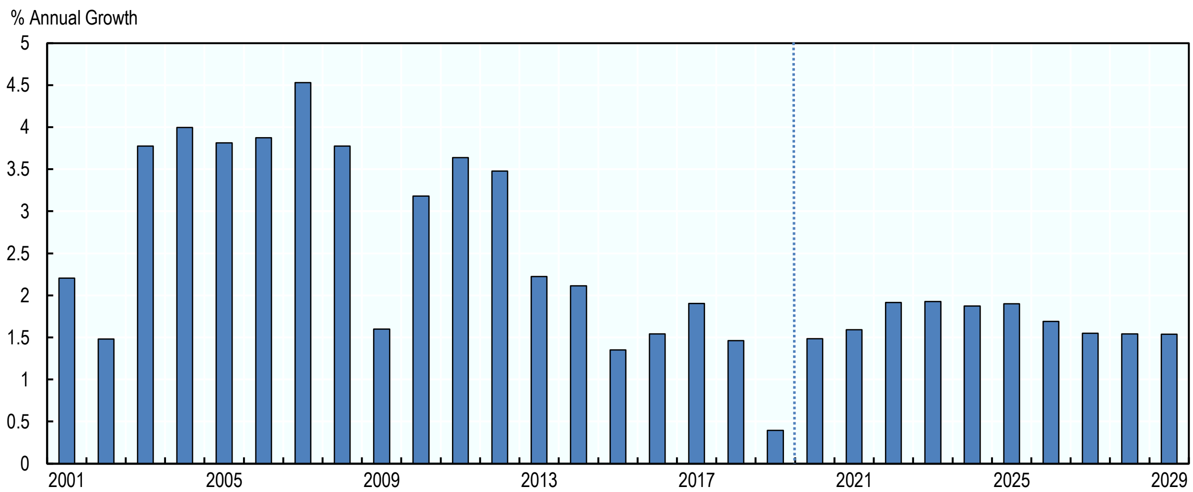
The region is the largest producer of agricultural and fish commodities, and is anticipated to account for 51% of global agriculture and fish output by 2029. Production is projected to expand by 14% by 2029 compared to the 2017-19 base level. Crop production, which represents 64% of value added, is projected to grow 12%, while that for livestock will increase 18% over the period, recovering from a low base due to ASF. Livestock production fell 4% in 2019, due to a 9% decline in China and Viet Nam, where ASF wiped out about 30% and 20% respectively of pig inventories in these countries. Fish output is projected to expand 16%, due to the continued expansion in aquaculture. These rates of growth are considerably less than a decade ago when regional agricultural and fish output growth averaged 3-4% p.a. Growth has slowed as domestic markets have matured, policies have changed, markets have opened, and trade competition has strengthened.

The region is a major producer of grains for the world, notably in rice with a 90% global production share. Its contribution to global rice, wheat and coarse grains output remains steady over the *Outlook*. While production of rice and wheat remains strong in India, the destocking of maize in China could create opportunities for diversifying production towards other commodities in that country.

Due to land scarcity within countries across the region, crop production growth will result from productivity enhancements and intensification. Irrigation expansion and improved seed varieties account for much of production growth, but there are mounting environmental and food safety concerns, associated with water scarcity and the heavy use of chemical inputs. Multiple harvests and double cropping will contain expansion in land use to an additional 3 Mha, compared to 13 Mha increase in area harvested, which will be allocated mostly to rice, maize, soybean and pulses.

Livestock production over the outlook period will also come largely from productivity gains sourced in increased feed intensity and breeding improvements. Pasture area is projected to contract by 12 Mha over the next ten years and animal numbers will grow at a slower rate than total meat production. Instead, increases in feed use will outpace meat production growth, which is projected to slow in part due to the ongoing consequences of African Swine Fever in China, and is expected to affect other countries in the region.

Figure 2.1. Slowing growth of agriculture and fish output in Asia Pacific region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Nearly 70% of global fish output is produced by the Asia and Pacific region, most coming from a combination of capture fisheries and aquaculture production in China. The efficiency and sustainability changes set out in China's 13th Five Year Plan are expected to constrain growth; the region will nonetheless account for 85% of global production growth in the sector.

Total GHG emissions by the region are projected to increase 6% by 2029, with those coming from crop and animal sources up by 3% and 9% respectively.

Consumption

As a region where population growth is slowing but income growth is robust, demand for calorie and nutrient dense foods will rise. Average calorie intake is projected to rise by 170 kcal/day to average 3 000 kcal mainly due to increases in vegetable oils and animal products, particularly dairy products. Average protein intake will rise 5 g to 85 g/day, mainly due to increases in dairy products and meat consumption.

Urbanised lifestyles will lead to growth in consumption of sugars and fats that will outpace that of most other food groups. Paired with stronger population growth in several countries of region such as India, consumption of vegetable oil will exceed the global average by 2029, reaching 21 kg/capita per year. Sugars and fats will comprise 22% of total calories in the region by 2029, the only food group to increase its calorie share over the outlook period.

Rice consumption per capita, which is so important in many countries of the region, often accounting for as much as 50% or more of calorie availability, is projected to grow slowly at best, and decline in many countries such as China, Thailand, and Viet Nam. Per capita rice consumption in the region is projected to rise less than 1%, as increased consumption in India offsets declines in other countries.

Meat consumption will rise by 1.5 kg/capita to an average consumption of 35 kg/capita per year (or 8% of daily calories); however there is large divergence within the region, in countries such as Korea and Viet Nam demand is rising more than 5 kg, whereas in India consumption will expand less than a kilogram. Dairy product consumption will expand by 25%, largely driven by consumption in South Asia. Dairy products will account for 15% of total calories in India and Pakistan by 2029.

With increasing livestock and dairy production, and increasing intensification through higher use of feed grains, feed use is projected to increase by over 50% by 2029. Feed use of maize and protein meals are projected to increase 58% and 65% respectively. Such growth in feed is also associated with increased commercialisation of farms, and less backyard production which may use non-grain inputs as feed.

The Asia and Pacific region is projected to account for 33% of global growth in ethanol use and 62% in biodiesel use given new mandates in China and Indonesia. In China, the blend rate will reach about 4% and will spur cassava imports, which are expected to come mostly from Thailand.

Although this *Outlook* assumes that the ambitious E10 mandate in China will not be reached by 2029, it does assume that gasoline-type fuels will be blended with 4% of ethanol. This corresponds to a production increase of 5 bln L as this *Outlook* assumes most of the ethanol demand will be produced from domestic feedstocks. This *Outlook* assumes the government of Indonesia will implement the B30 programme nationwide as planned, but reaching the intended target to increase biofuel demand will largely depend on the relationship between domestic and palm oil international prices. By 2030, biodiesel demand would reach about 7 bln L.

In Indonesia, an increase in the blending mandate is expected to redirect domestic palm oil supplies to the biodiesel market, and could help catalyse investment in the sector. Limited land availability and low vegetable oil prices are leading to replanting delays in oil palm, underpinning slower growth in the region's vegetable oil production over the outlook period. Production will expand 17% up to 2029 compared to 65% over the last ten years.

Trade

The region is the largest net importing region for primary agricultural commodities, with over 40% of global imports, and net imports are trending higher over the medium term as demand outpaces supply. The largest imports are soybeans into China, which were reduced in recent years due to trade actions; they are anticipated to resume growth in the medium term. Wheat and maize imports are also significant and growing.

Net imports of livestock products are rising. While exports of bovine meat by India, Australia, New Zealand and Thailand continue to rise slowly, they are more than offset by rising imports by China, Indonesia, Malaysia, Korea, Viet Nam and other countries of the region. Net pigmeat imports have trended higher in the last decade, and spiked to 6 Mt in 2019 as a result of the ASF outbreak. The region's poultry imports too have been rising.

The region is also a major exporting region contributing 30% of global exports. The largest primary export commodity is rice, which is projected to rise to 55 Mt, led mainly by India, Thailand, and Viet Nam.

Figure 2.2. Change in area harvested and land use in Asia Pacific

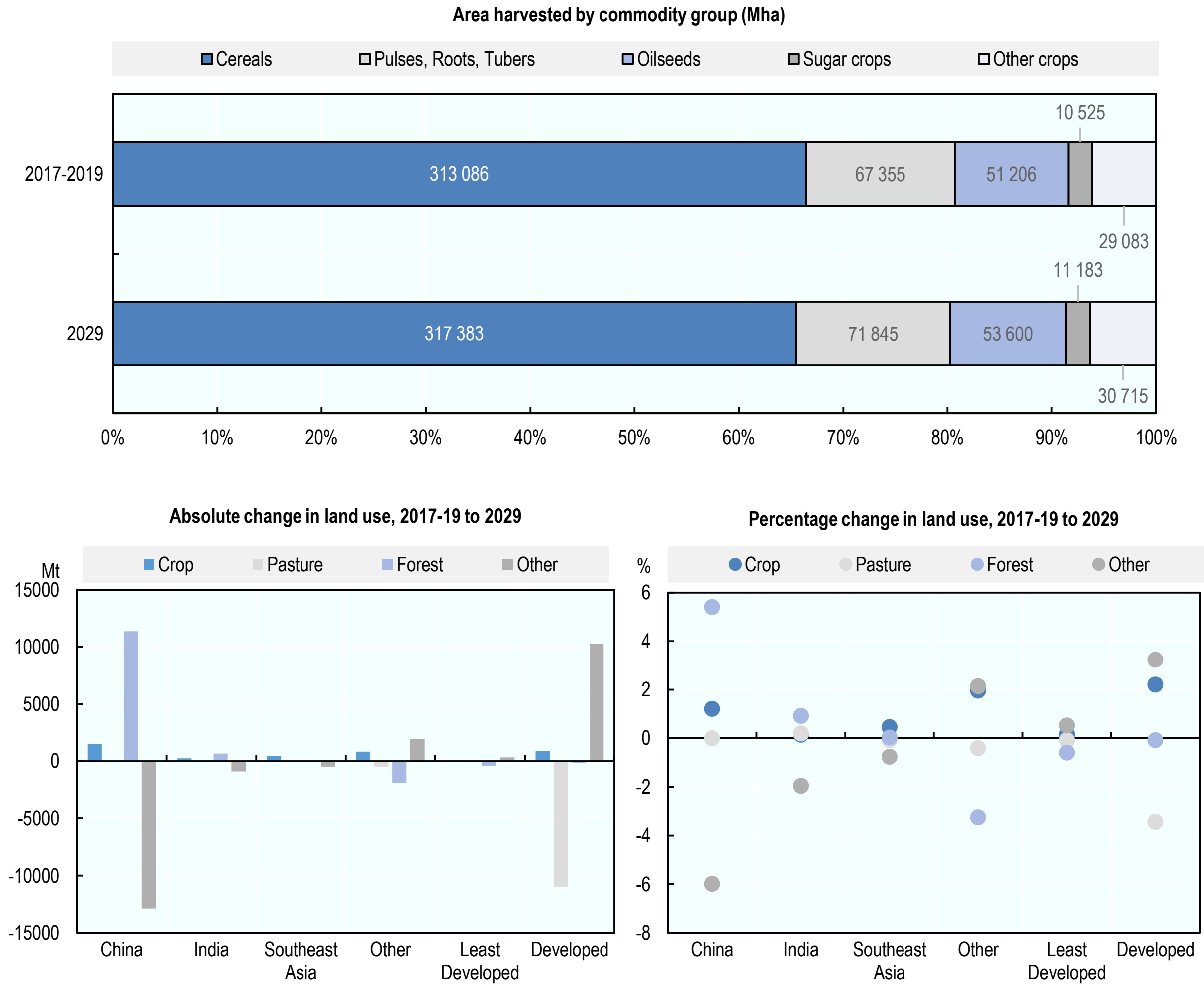
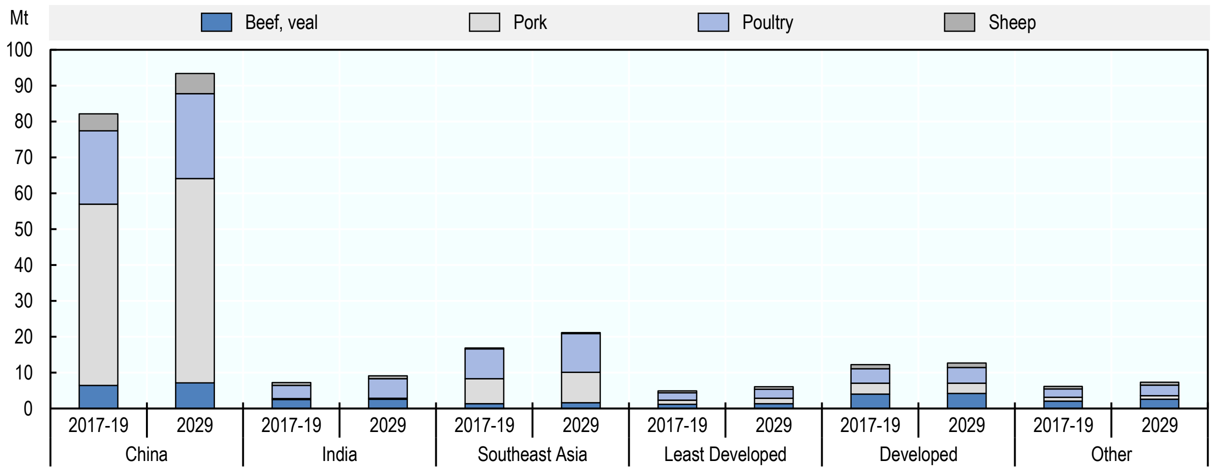
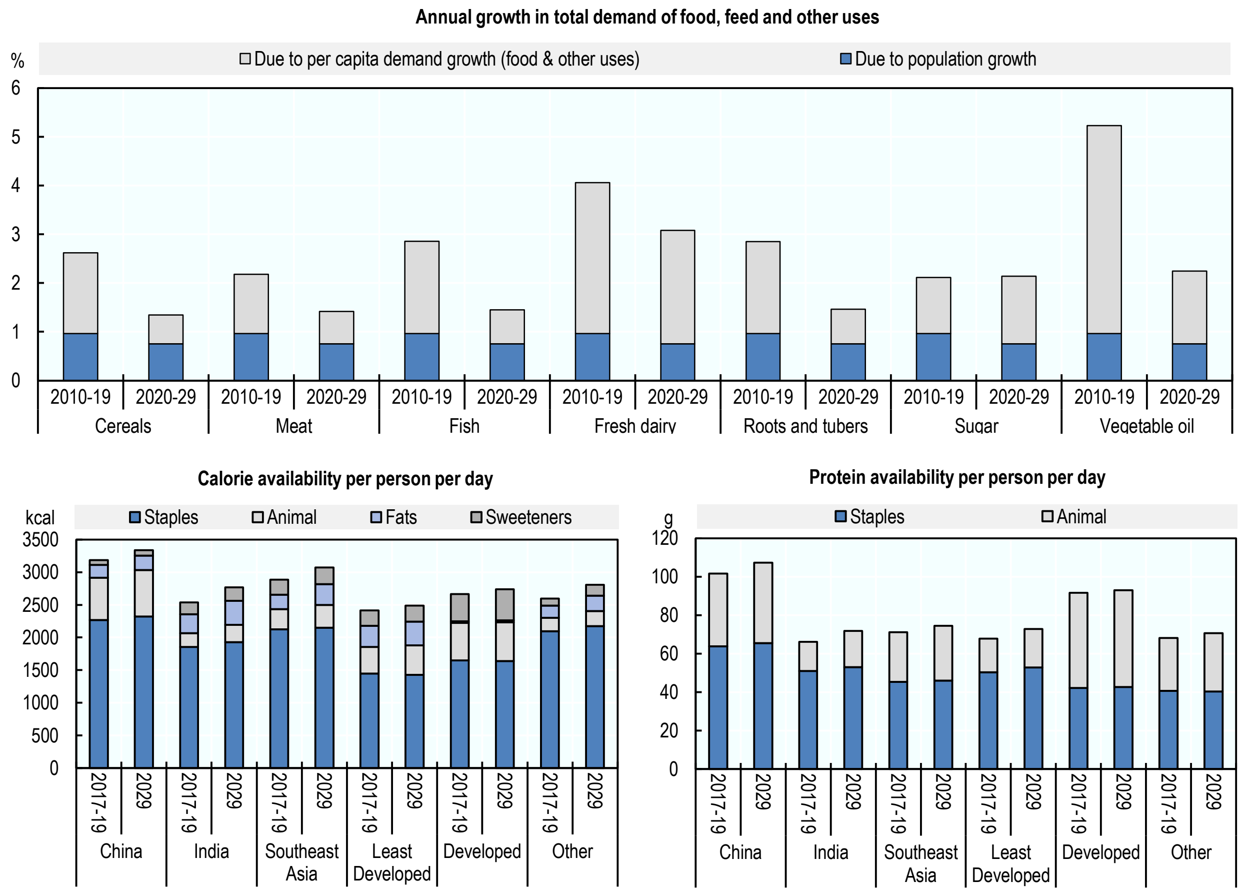


Figure 2.3. Livestock production in Asia Pacific



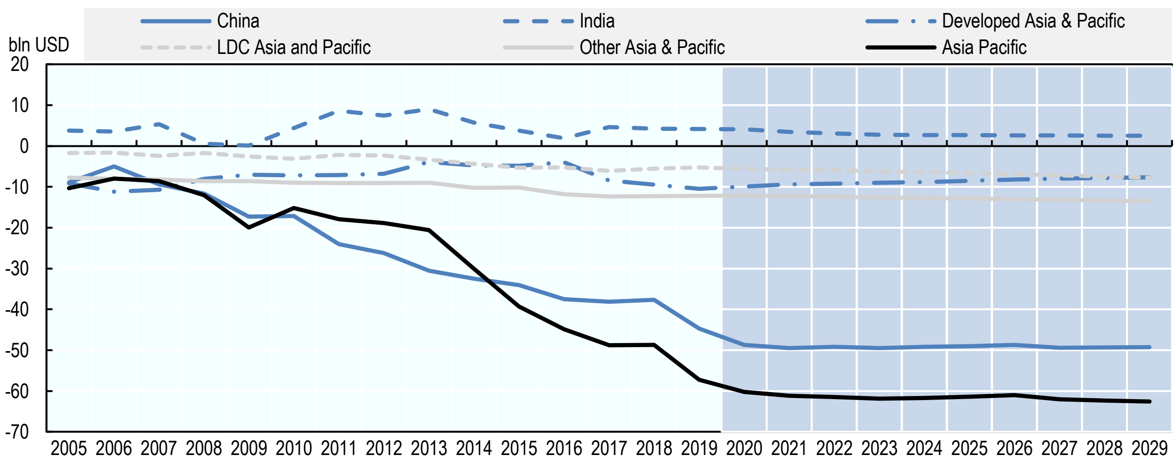
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 2.4. Demand for key commodities and food availability in Asia Pacific



Note: Upper panel – population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.5. Agricultural trade balances in Asia Pacific



Note: Net trade (exports minus imports) of commodities covered in the Agricultural Outlook, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Table 2.1. Regional Indicators: Asia and Pacific

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	3 766 151	4 146 172	4 469 965	7.81	0.94	0.65
Per capita GDP[1] (kUSD PPP)	4.94	7.10	10.55	48.62	3.61	3.76
Production (bln USD)						
Net value of agricultural and fisheries[3]	1163.5	1457.8	1738.4	19.25	1.96	1.75
Net value of crop production[3]	289.8	350.0	404.4	15.53	1.35	1.31
Net value of other not incl. crop production[3]	449.5	578.1	710.5	22.90	2.18	1.90
Net value of livestock production[3]	234.9	282.2	334.5	18.54	1.62	2.17
Net value of fish production[3]	189.2	247.4	288.9	16.79	2.73	1.54
Quantity produced (kt)						
Cereals	920 977	1142 689	1314 673	15.05	1.58	1.34
Pulses	28 075	38 062	46 458	22.06	2.53	1.73
Roots and tubers	70 862	91 745	106 626	16.22	2.52	1.23
Oilseeds[4]	67 035	76 800	91 175	18.72	0.65	1.34
Meat	107 832	129 669	149 862	15.57	1.11	2.41
Dairy[5]	32 920	47 315	62 517	32.13	3.77	2.45
Fish	92 068	120 284	140 453	16.77	2.72	1.54
Sugar	57 254	72 553	83 823	15.53	1.37	1.89
Vegetable oil	78 707	121 646	146 573	20.49	4.05	1.56
Biofuel production (Mn L)						
Biodiesel	1 791	10 208	12 435	21.81	14.26	0.16
Ethanol	10 407	16 459	20 421	24.07	4.07	1.08
Land use (kha)						
Total agricultural land use	1 440 311	1 404 635	1 397 114	-0.54	-0.35	-0.05
Total land use for crop production[6]	491 474	515 691	519 675	0.77	0.40	0.06
Total pasture land use[7]	948 837	888 943	877 439	-1.29	-0.77	-0.12
Direct GHG emissions **(Mt CO2-eq)**						
Total	2176	2345	2489	6.12	0.46	0.53
Crop	1010	1084	1113	2.67	-0.01	0.25
Animal	1166	1261	1376	9.08	0.88	0.76
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2664	2826	2992	5.87	0.50	0.57
Daily per capita protein availability[8](g)	74	81	85	5.36	0.92	0.54
Per capita food availability (kg)						
Staples[9]	173.4	178.9	180.8	1.09	0.18	0.05
Meat	23.4	26.6	28.4	7.01	0.63	1.44
Dairy[5]	8.5	11.4	14.1	24.02	3.03	1.88
Fish	21.5	26.0	28.2	8.67	1.98	0.81
Sugar	15.9	17.8	20.4	14.61	1.39	1.29
Vegetable oil	13.4	17.8	21.1	18.36	3.13	1.45
Trade (bln USD)						
Net trade[3]	-13.5	-51.6	-62.6	21.31	..	..
Net value of exports[3]	93.1	122.6	139.3	13.62	1.46	1.48
Net value of imports[3]	106.7	174.2	201.9	15.90	4.58	1.09

	Average		2029	%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	96.4	94.1	94.3	0.27	-0.49	0.04
Meat	97.9	94.9	95.3	0.43	-0.40	0.27
Sugar	95.5	96.4	91.4	-5.10	0.05	-0.14
Vegetable oil	116.9	110.8	106.7	-3.73	-0.62	-0.27

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.3. Regional outlook: Sub Saharan Africa

Background

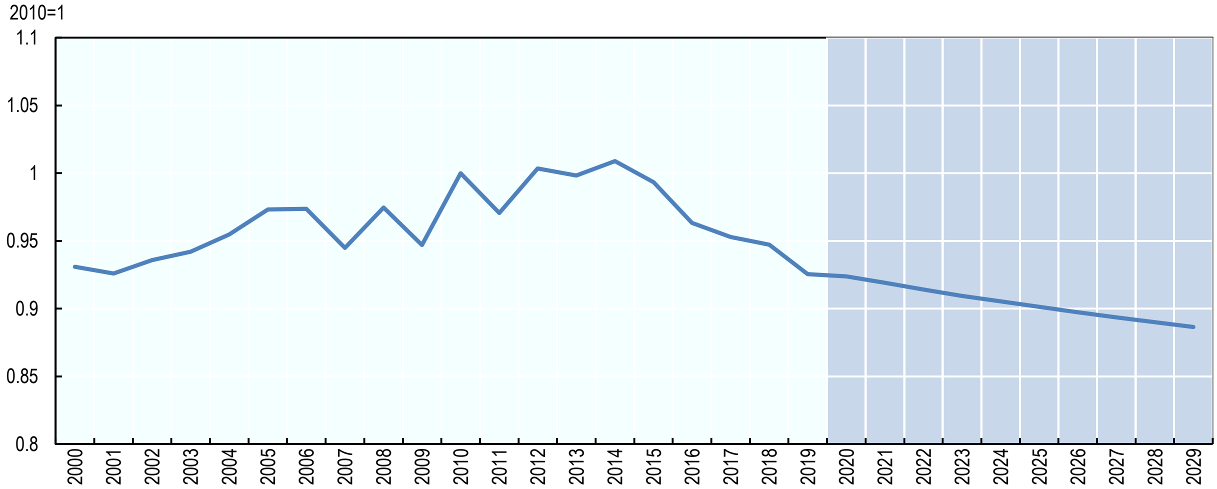
The demographic and economic growth profile of Sub-Saharan Africa[3] is unique among the six regions.[4] Population growth is highest and while urbanisation has been growing quickly, it remains by far the lowest among the regions. The region is anticipated to add some 329 million people by 2029 compared to the 2017-19 base period, growing at over 2.5% p.a., and while almost two thirds of that addition will be urban, 55% of the population will still live in rural areas by 2029. Economies in the region typically have a high dependency on resource commodities, including agriculture, oil and metals. Agriculture, fish and forestry account for about 16% of GDP, and this is expected to around 13% by 2029. Per capita economic growth is anticipated not to be as robust as in emerging developing countries, expanding by 1.3% p.a. over the outlook period. Economic performance varies considerably within the region, with least developed economies growing faster, albeit from a lower base level. Average per capita incomes in the region are the lowest globally, but are projected to rise 20% over the next decade. However, average per capita incomes in least developed countries (LDCs) of the region will only average USD 1 100 per year by 2029. Households in the region spend on average about 38% of their incomes on food, but this share varies considerably by country, from as low as 18% in South Africa to about 50% in Rwanda.[5] Nevertheless, with per capita calorie availability significantly lower than in other regions, any food price or income shock threatens to have serious repercussions on food security and economic welfare.

Sub-Saharan Africa is an agro-ecologically diverse, land abundant region, accounting for 14% of global cropland and 21% of pasture. Nonetheless, the agricultural sector in many countries faces land shortages given high population density in rural areas, such that most available land is concentrated in few countries and/or is largely under forest cover. The region thus produced only 7% of the global value of agricultural and fish production in 2017-19. By contrast, given its sizeable consumption requirements, the region consumed 37% of global roots and tubers, 21% of global pulses but just 7% of global cereals. Compared to other regions, Sub-Saharan Africa's consumption of sugar and vegetable oil also remained low, both at only 7% of global use. Overall, Sub-Saharan Africa's self-sufficiency for major food commodities is decreasing, as the region's population is expanding quickly, beyond the pace of growth in domestic supply.

Production

Agricultural and fish production in the region is expected to grow by 21% over the next ten years in net value added terms, implying that per capita production in the region will continue the decline that started in 2015 (Figure 2.6). Crop production is projected to account for over three quarters of total production, while the share of livestock products will gain marginally to 16% and the share of fish production will decline to under 8%. Food and feed staples, namely coarse grains, pulses, roots and tubers, will be the main sources of growth for the region. Each of these are commodities for which the region's global market share will rise over the outlook period. By 2029, the SSA region may account for over 40% of global roots and tubers output, 8% of coarse grains production and 20% of pulses output. Support to the cotton sector, paired with area expansion in West Africa will sustain cotton production, which is projected to grow by nearly 40% by 2029 at regional level.

Figure 2.6. Per capita value of net agriculture and fish production in Sub Saharan Africa



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Area harvested is expected to expand by more than 4 Mha by 2029. Due to cropping intensification (such as double cropping) this net growth is expected despite a small reduction in agricultural land use. The expansion of rice cultivation in the region, notably in Nigeria, is expected to be based upon multiple harvests per year. Inter-cropping is also common in soy producing regions of South Africa, obtaining multiple crops from the same plot of land.

In other parts of the region, the ongoing expansion of agricultural land use is constrained by various sources of uncertainty, including land fragmentation trends, conflict in land abundant countries, and the presence of other competing uses such as mining and urban sprawl.

Average cereal yields across the region are projected to grow 16% over the outlook period, about the same rate as the last ten years. Yields for major crops in the region will continue to increase. based on investments in locally adapted improved crop varieties, and optimised management practices. Rapid growth in yields will help narrow the region's gap with yields achieved in the rest of the world, which on average are more than twice those achieved in Sub-Saharan Africa. Although productivity improvements will be central to output growth in the medium term, fully closing the yield gap is challenged by the limited use of inputs, irrigation and farm infrastructure.

Livestock production is projected to expand by 25% over the next ten years, with the fastest increases coming from poultry and milk production. The region will add 1.1 Mt of new bovine meat output, based on a 17% increase in animal numbers and 5% increase in productivity by 2029; by then the region will have 18% of the global bovine herd. Ovine meat production will grow faster over the next decade; the region will increase its share of global production by 1% to 14% by 2029. Meat production will be based primarily on larger herds, grazing on diminishing pasture area, while feed use will remain stable, growing in line with average meat production over the next decade. For poultrymeat, greater feed intensity will support increased production as the supply chain modernises in countries such as South Africa and Zambia.

Based on these production projections, direct greenhouse gas (GHG) emissions from agriculture are expected to grow by a large 18% by 2029 compared to the base period. Sub-Saharan Africa will account for 44% of the global increase in direct emissions from agriculture and will reach a share of 17% of global direct emissions by 2029.

Consumption

Population growth remains by far the main driver of total consumption growth for major food commodities. With rising calorie use, and a rising population, the region's share of global food calorie consumption is anticipated to rise from about 11% in the base period to 13% in 2029, constituting one of the largest sources of additional demand for the global agricultural sector.

For many commodities, including cereals, pulses, sugar, vegetable oils, per capita consumption levels are currently the lowest in the world. Substantial growth in these commodities is expected in the coming decade.

Calorie intake is nonetheless expected to remain the lowest in the world, adding 75 kcal/day over the outlook period, to reach about 2 510 kcal/capita per day in 2029, compared to the projected world average of 3 014 kcal/day. An increasing share of calories will come from cereals, vegetable oils and sugar, while meat and fish consumption will not rise in per capita terms over the next decade, thus limiting gains in vital nutrients.

The region concentrates most of the world's poor and undernourished individuals, necessitating improvements in availability, accessibility and utilisation of food supplies.

Roots and tubers, followed by cereals, are the main sources of feed for the region's livestock sector. However, total feed use in the region is low, accounting for only 4% of global feed consumption.

Trade

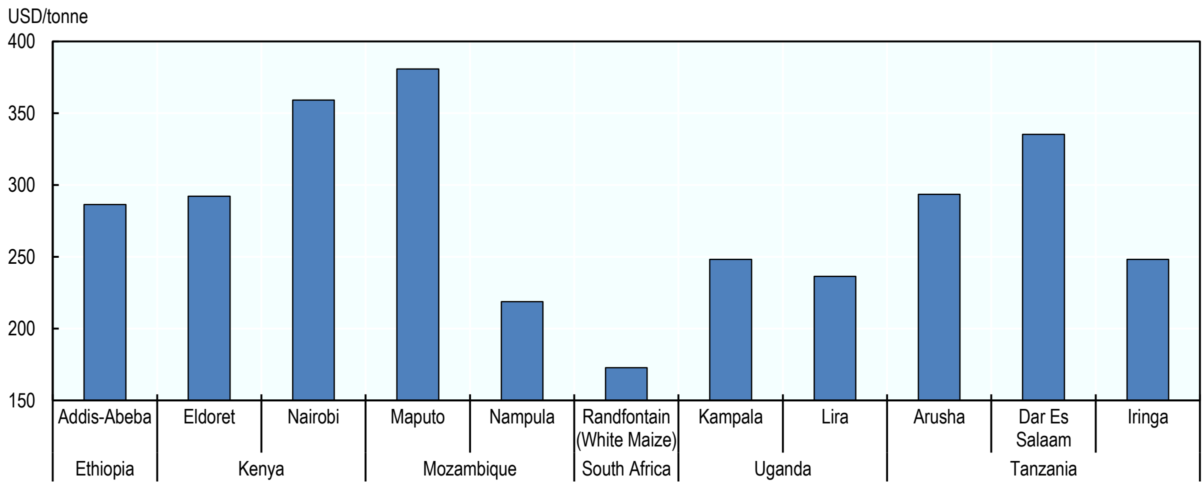
Most basic food commodities in the region are produced for domestic consumption rather than exports as the region increasingly relies on imports to close the gap between domestic production and consumption. The region's trade deficit in major food items is anticipated to widen. Evaluated at constant (2004-06) global reference prices, the deficit is anticipated to grow from about USD 18 billion to USD 31 billion by 2029.

Import volumes of cereals, meat, sugar and oils are rising. Apart from sugar, imports are growing at a faster rate than production or exports. In fact, exports are decreasing for nearly all main commodities. The region is not self-sufficient in basic commodities and instead, its import dependence is expected to deepen over the next ten years.

Most cotton production is sold on global markets, and the role of the region in global markets is expected to rise over the outlook period. Nearly 90% of cotton production from the region will be exported by 2029, most of which comes from the least-developed countries of the region. The region will account for 18% of global cotton exports by 2029. In the light of favourable cotton prices projected over the outlook period, the sector is expected to slightly increase its share in the total value of crop output for the region.

Improving internal trade in the SSA region is an important policy objective. As a result of the African Continental Free Trade Agreement signed in 2019, tariffs will be reduced to zero on 90% of products originating in signature countries by 2020, and on 97% of products by 2030. According to recent estimates by the UN Economic Commission for Africa, the agreement is projected to increase intra-African trade of agriculture and food products by 20-35% (or USD 10-17 bln). Intra-trade gains are expected to be particularly pronounced for meat products, milk and dairy products, sugar, beverages and tobacco, vegetables/fruit/nuts and paddy and processed rice. However, high non-tariff barriers exist to trade within the region, and these are more difficult to remove or reduce. A major contributor in this regard is the high cost of road transportation, which emanates from poor infrastructure, as well as inefficiencies at border posts. Other non-tariff measures such as Sanitary and Phytosaitary regulations have increased over time and the imposition of discretionary export controls inhibits better market integration. Figure 2.7 shows diverse maize prices in various cities in the region, illustrating the lack of market integration due to both tariff and non-tariff barriers.

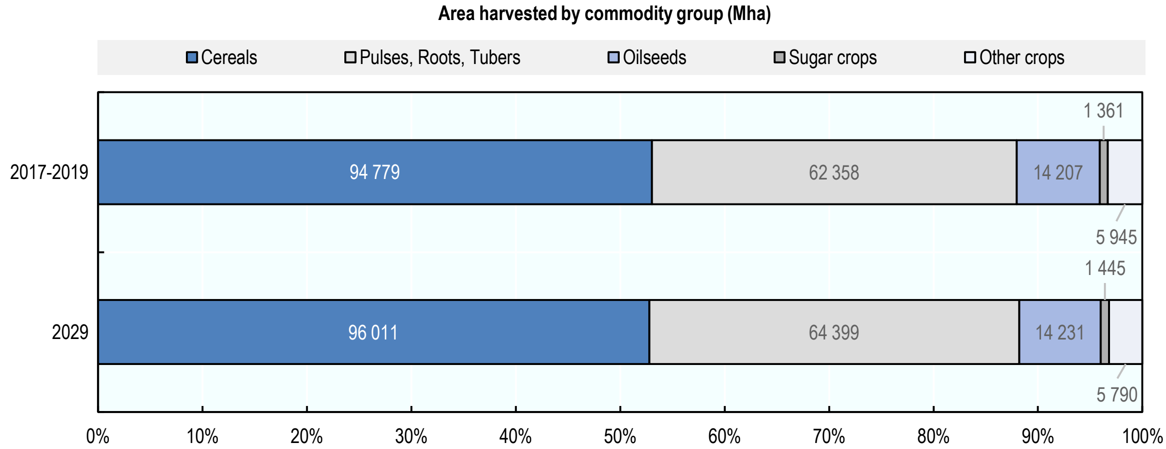
Figure 2.7. High price spreads for maize across the region indicate low market integration

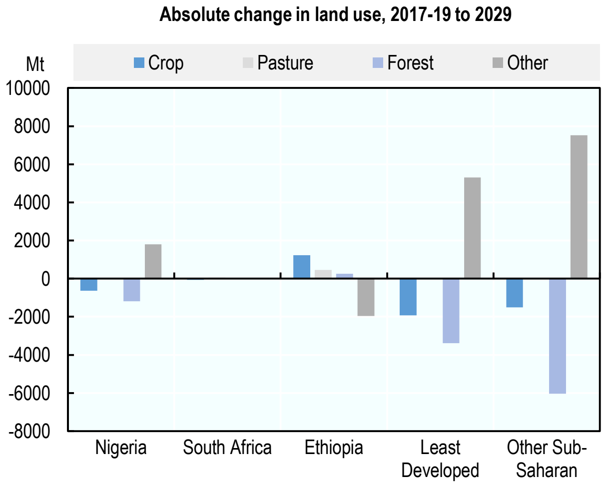


Note: Wholesale prices collected by the FAO GIEWS FPMA tool for 2018.
Source: FAO GIEWS FPMA (2020).

StatLink https://doi.org/10.1787/888934141798

Figure 2.8. Change in area harvested and land use in Sub Saharan Africa





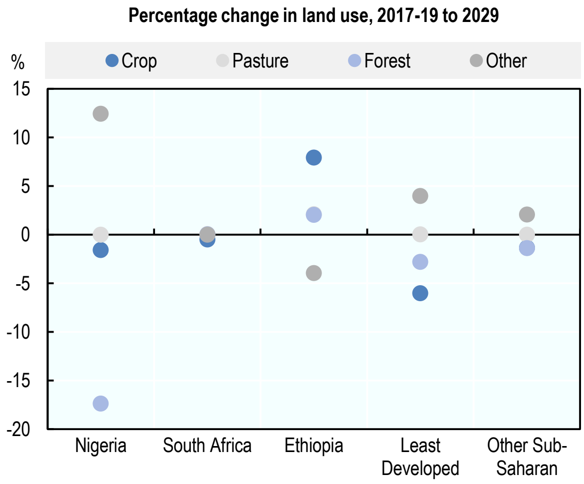
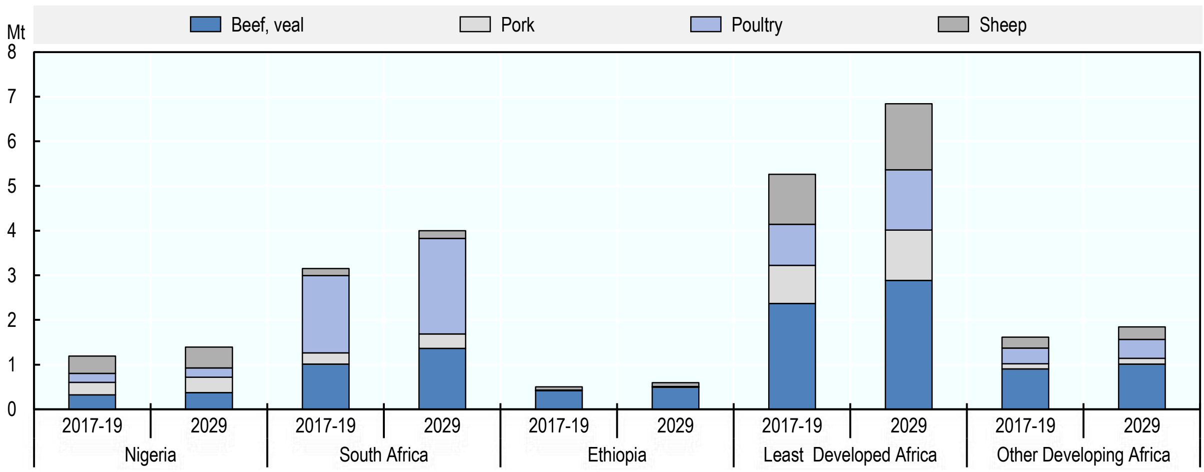
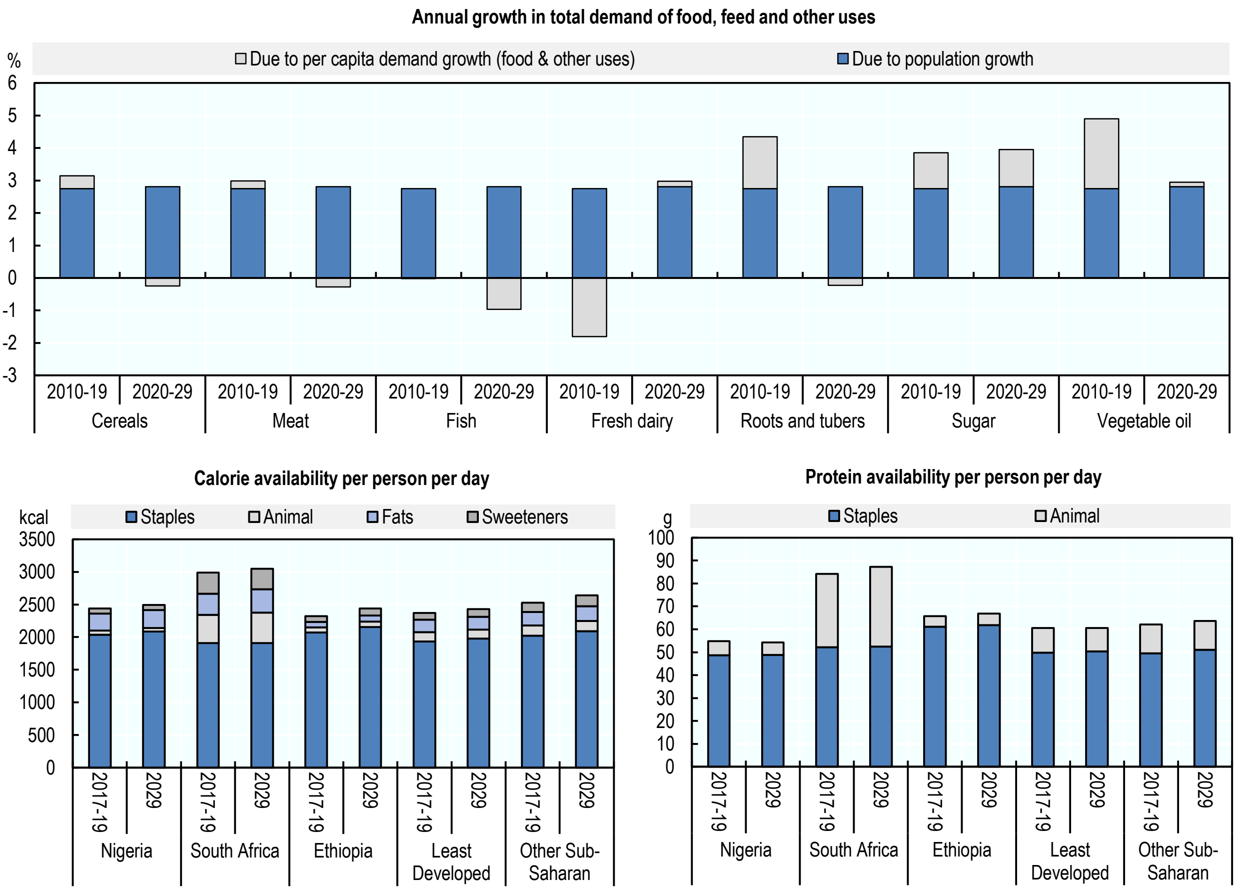


Figure 2.9. Livestock production in Sub Saharan Africa



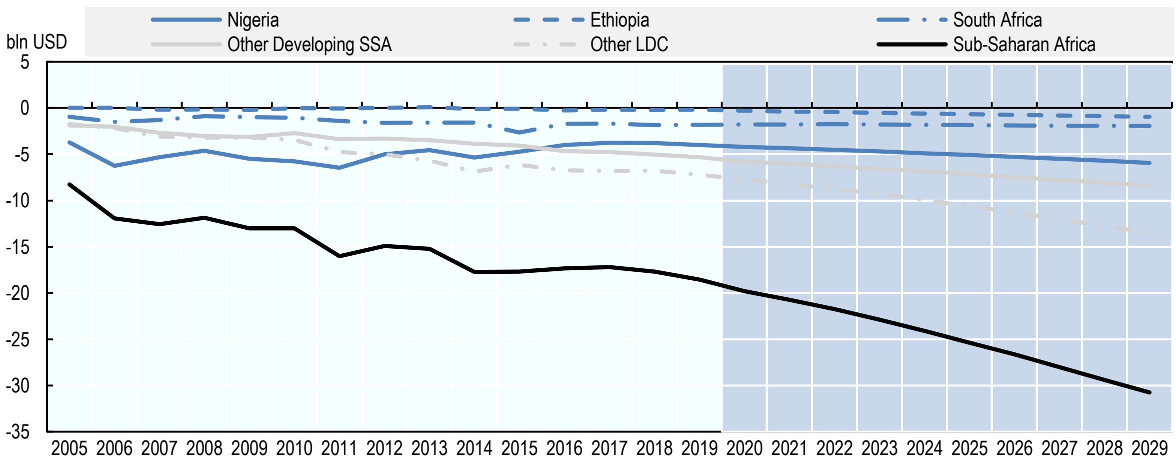
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 2.10. Demand for key commodities and food availability in Sub Saharan Africa



Note: Upper panel - population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.11. Agricultural trade balances in Sub Saharan Africa



Note: Net trade (exports minus imports) of commodities covered in the Agricultural Outlook, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141817

Table 2.2. Regional indicators: Sub Saharan Africa

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	786 849	1 032 263	1 361 538	31.90	2.74	2.53
Per capita GDP[1] (kUSD PPP)	2.24	2.61	3.13	20.23	1.04	1.93
Production (bln USD)						
Net value of agricultural and fisheries[3]	139.6	180.5	224.2	24.18	1.97	2.06
Net value of crop production[3]	39.5	55.0	67.1	22.08	2.86	1.78
Net value of other not incl. crop production[3]	65.8	81.8	104.4	27.57	1.44	2.28
Net value of livestock production[3]	22.8	27.8	35.5	27.79	1.35	2.47
Net value of fish production[3]	11.6	15.9	17.1	7.73	2.86	1.07
Quantity produced (kt)						
Cereals	109 695	141 025	169 397	20.12	2.42	1.66
Pulses	12 350	17 788	19 758	11.08	2.83	0.93
Roots and tubers	56 740	86 825	112 016	29.01	3.67	2.28
Oilseeds[4]	8 044	11 149	13 288	19.18	2.26	1.58
Meat	9 080	11 715	14 675	25.27	2.36	2.21
Dairy[5]	3 163	3 543	4 701	32.66	0.11	2.78
Fish	5 626	7 695	8 291	7.75	2.84	1.07
Sugar	6 445	7 632	10 174	33.31	1.56	2.53
Vegetable oil	4 657	6 855	8 106	18.24	2.82	1.37
Biofuel production (Mn L)						
Biodiesel	0.04	0.04	0.06	41.11	0.00	3.51
Ethanol	498	827	1 056	27.61	5.95	2.16
Land use (kha)						
Total agricultural land use	873 660	888 354	886 033	-0.26	0.09	-0.02
Total land use for crop production[6]	196 204	210 088	207 202	-1.37	0.39	-0.13
Total pasture land use[7]	677 456	678 266	678 831	0.08	0.01	0.01
Direct GHG emissions (Mt CO2-eq)						
Total	618	827	972	17.54	2.81	1.49
Crop	216	262	306	16.56	1.34	1.31
Animal	402	565	666	18.00	3.56	1.57
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 393	2 438	2 504	2.71	0.00	0.30
Daily per capita protein availability[8](g)	61	62	62	0.30	-0.16	0.11
Per capita food availability (kg)						
Staples[9]	176.9	191.9	196.6	2.41	0.65	0.25
Meat	10.4	10.7	10.4	-2.51	-0.23	-0.07
Dairy[5]	4.6	3.8	3.8	0.62	-2.61	0.28
Fish	9.0	9.0	8.2	-8.85	-0.70	-0.70
Sugar	10.8	12.0	13.4	11.75	1.09	1.07
Vegetable oil	7.0	8.7	9.1	4.96	1.18	0.49
Trade (bln USD)						
Net trade[3]	-12.5	-17.8	-30.7	72.61	..	..
Net value of exports[3]	7.3	9.7	9.4	-3.78	1.78	-0.55
Net value of imports[3]	19.8	27.5	40.1	45.64	2.60	3.48

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	84.1	80.8	74.9	-7.3	-0.66	-0.74
Meat	88.4	85.0	82.9	-2.5	-0.13	-0.24
Sugar	76.1	61.9	55.1	-11.0	-2.03	-1.08
Vegetable oil	58.3	53.4	47.1	-11.7	-1.23	-1.26

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see Glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.4. Regional outlook: Near East and North Africa

Background

The Near East and North Africa[6] region is a difficult environment for agriculture and fish production. Land and water resources in the region are low. Less than 5% of land is arable. All countries in the region, except for Iran, Iraq, and Mauritania face water scarcity, and for some countries water scarcity is extreme, at less than one quarter of sustainable levels on a per capita basis.

The countries of the region have diverse income and resource profiles. Among them are least developed, middle income, and high income oil exporting countries in the Gulf. As one of the highest food net importing regions, and the highest in terms of net imports per capita, self-sufficiency rates for most commodities are low, particularly for cereals. It faces significant uncertainties on both the supply and demand side, and these uncertainties raise concerns regarding reliable access to basic foods. The limited land and water resources that are characteristic of most countries in the region constrain growth and have been further stretched by policy incentives that have sought to increase production to limit the deficit in cereal trade. On the demand side, uncertainties abound with geopolitical conflict that hinders production, reduces needed investments and induces displacement of populations. Furthermore, revenues from oil exports are the main source of the region's income and unstable energy markets affect economic activity including consumption and investment. With food expenditures around 16% of total household expenditures, income and price shocks can have an important impact on welfare.[7]

Population growth, which exceeded 20% in the last decade, is the key source of additional demand. It will grow further by 1.5% annually over the next decade. Three-quarters of the additional population will be urban which may encourage consumption of higher value products, including those that include vegetable oil and sugar, but also meat and dairy products. Per capita incomes in the region are assumed to grow only 1% p.a., and will not constitute a major driver of demand over the next ten years.

Egypt and Iran produce 50% of the net value of agriculture and fish production in the region, and their shares are expected to increase marginally while the Other North Africa region produces 25%, the least developed countries 8% and remaining countries about 17%. Gross domestic product in the agriculture, forestry and fishery sector is currently about 5.3% of total GDP in the region, and this share will shrink to 4.7% by 2029.

Fish production is about 12% of total net agricultural and fish production. Capture in coastal areas has grown most recently, but fish stocks are under pressure. Aquaculture is growing but limited to key rivers in Egypt and Iran.

Production

Agricultural and fish production in the region is projected to expand by 1.5% p.a. over the next ten years, marginally below population growth of 1.6%, implying increasing dependency of the region on the global markets. Crop production share of production will remain at 63% of total net value, as it grows 1.5% p.a. while livestock grows at 1.4% p.a. and fish at 1.5% p.a. over the next decade.

Land use under crops will increase marginally as pasture declines. Land use in cereal production is projected to remain unchanged at 50% of total crop use, while wheat's share of cereals may increase to 43%. Total area harvested in the region is expected to remain stagnant, and yield improvements will account for all crop production gains, with wheat, maize and rice yields growing at 0.7%, 1.5% and 1.5% p.a. respectively. Wheat yields will remain at 70% of the global average, while maize yields will remain close to global average.

Poultry production will grow faster than the production of other meat products at 1.9% p.a., down from 2.6% p.a. in the last decade, while bovine meat production is anticipated to grow 1.2% p.a. again in the next ten years. These rates of growth will help to curb the longer term decline in meat self-sufficiency.

With 1.6% annual growth in livestock production, the region's GHG emissions from livestock activities will expand only 3% by 2029 compared to the base period. Emissions from ruminants, such as cows and sheep, are expected to decline due to a decrease in herd size, but emissions from poultry are expected to increase in step with its production. Total GHG emissions in the region are projected to expand 3% by 2029.

Consumption

Food policies in the region have focused also on food security by supporting consumption of basic foodstuffs, primarily cereals. Average calorie availability in the region will average almost 3 100 kcal/day by 2029, an increase of 41 kcal/day from the base period, and marginally higher than the global average of 3 014 kcal/day.

The projection for the average diet in the region indicates about 54% of calories will come from cereals by 2029, down 1% from the base period. This compares to the world average of 44%. A similar phenomenon applies to sugar consumption, where the regions sugar calorie share of the total will be 10% compared to a global average of 7%. This diet, which relies on starchy foods and sugar, is associated with a rising incidence of over-weight and obesity, and various noncommunicable diseases such as diabetes. With undernourishment remaining prevalent in certain countries, the "triple burden" of malnutrition will be a policy challenge over the medium term.

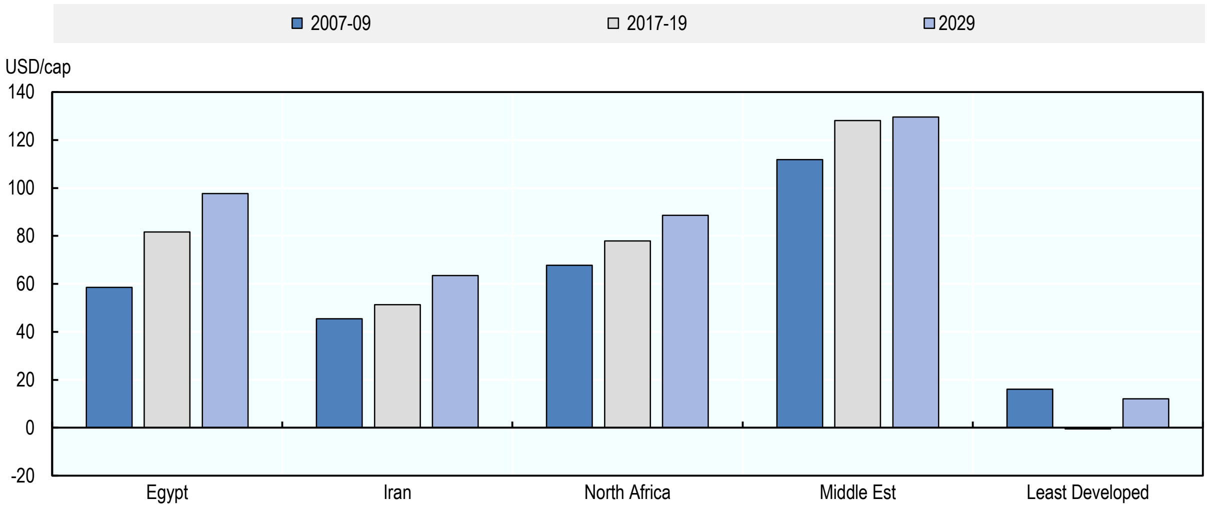
The average level of protein availability in the region is projected to be 85 g/day in 2029, up only 0.8 g/day from the base period. A fall in protein from cereal consumption is expected to be more than offset by rises from meat and fish sources and from pulses. Protein availability in the region will be similar to the global average.

The growth of the livestock sector will increase feed use. Three commodities, maize, barley and protein meals are expected to account for about 75% of the total feed use, with imports accounting for about 90% of feed demand. This trend reflects policies that prioritise the production of food crops over feed crops. The region is a large importer of animal feed and will import 47 Mt of maize by 2029 compared to 36 Mt in the base period.

Trade

The region's strong population growth together with limited production capacity will drive higher food imports over the projection period. The region is expected to remain the second largest importer of food following the Asia and Pacific region but on a per capita basis will be the largest. Within the region, food imports per person are highest in the Other Middle East area, which includes the Gulf States, followed by Egypt and other countries of North Africa.

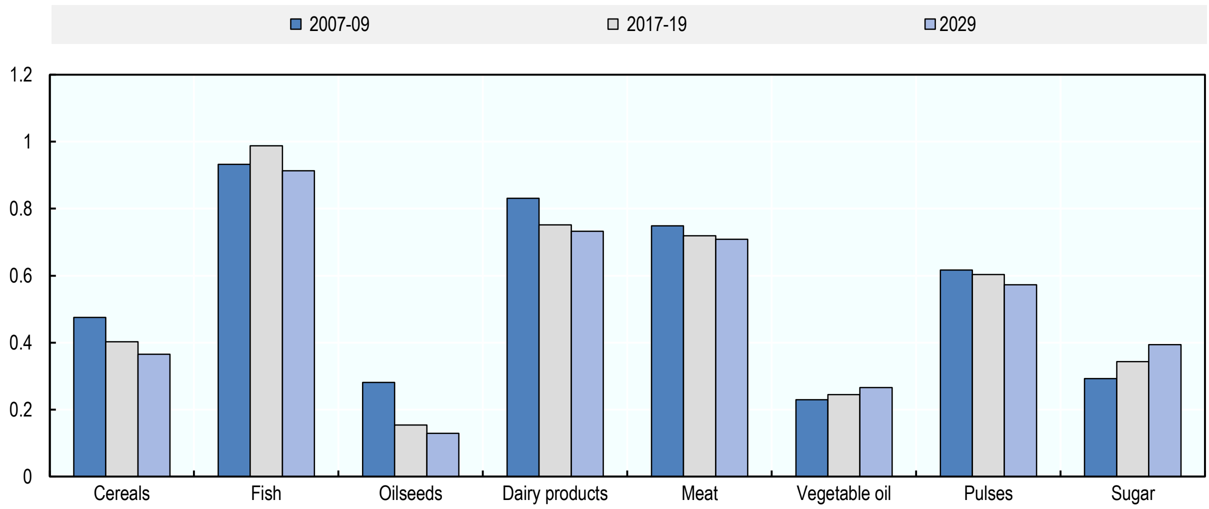
Figure 2.12. Value of net food imports per capita in Near East and North Africa



Note: Values in 2004-06 constant.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
StatLink https://doi.org/10.1787/888934141836

The regions imports will increase for almost all commodities and, with the exception of fish and meat products, self-sufficiency ratios will remain low and possibly continue their long-term decline, as seen in Figure 2.13. The region's imports will maintain high shares of certain global markets such as maize, other coarse grains and wheat which will rise to 24%, 46% and 28% respectively by 2029. The region's imports will also account for 20% of global trade in poultry meat and cheese, and 35% of sheep meat trade.

Figure 2.13. Self-sufficiency rates for selected commodities in Near East and North Africa



Note: Self-sufficiency is calculated by dividing quantity produced by quantity consumed.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
StatLink https://doi.org/10.1787/888934141855

Figure 2.14. Change in area harvested and land use in Near East and North Africa

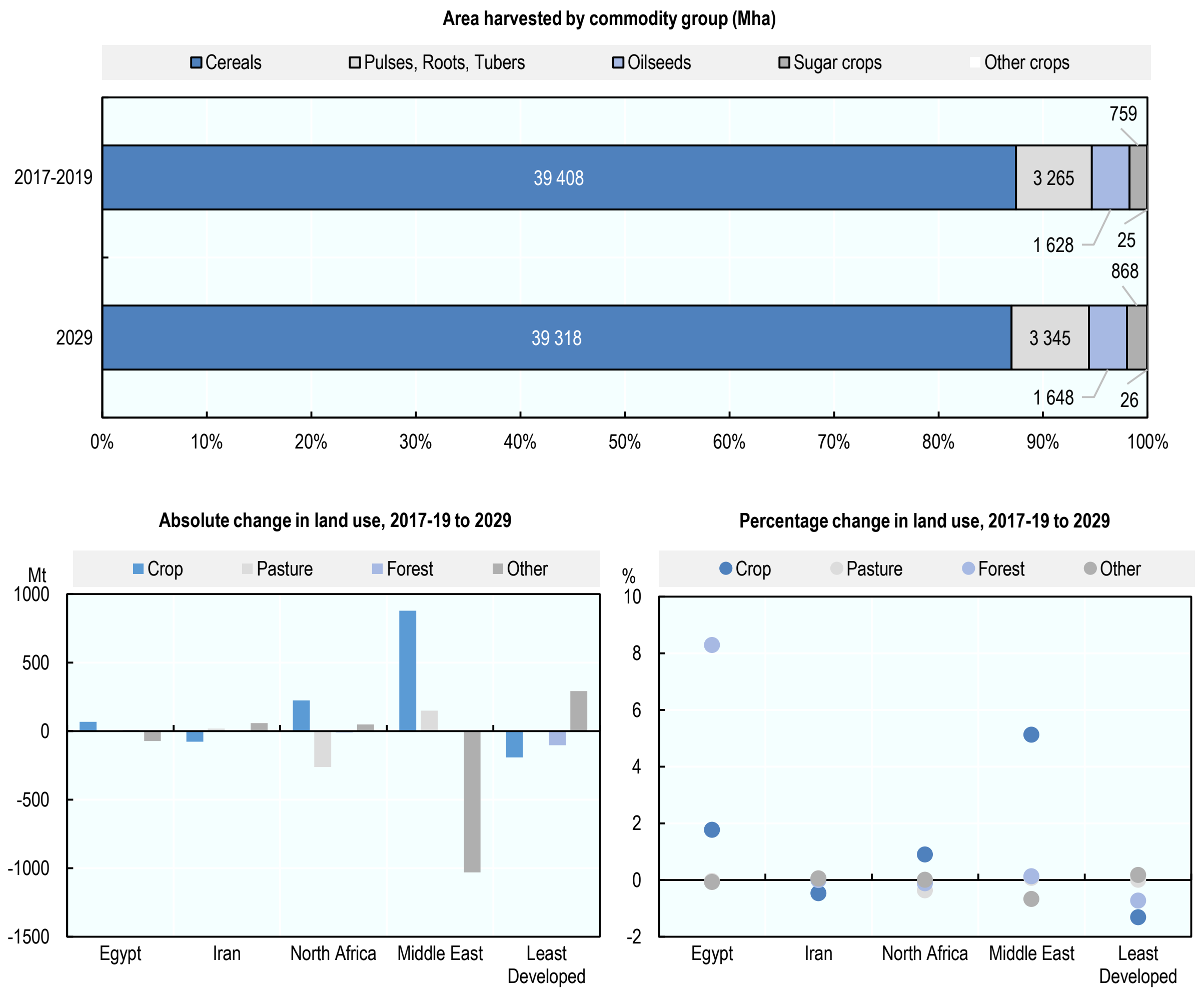
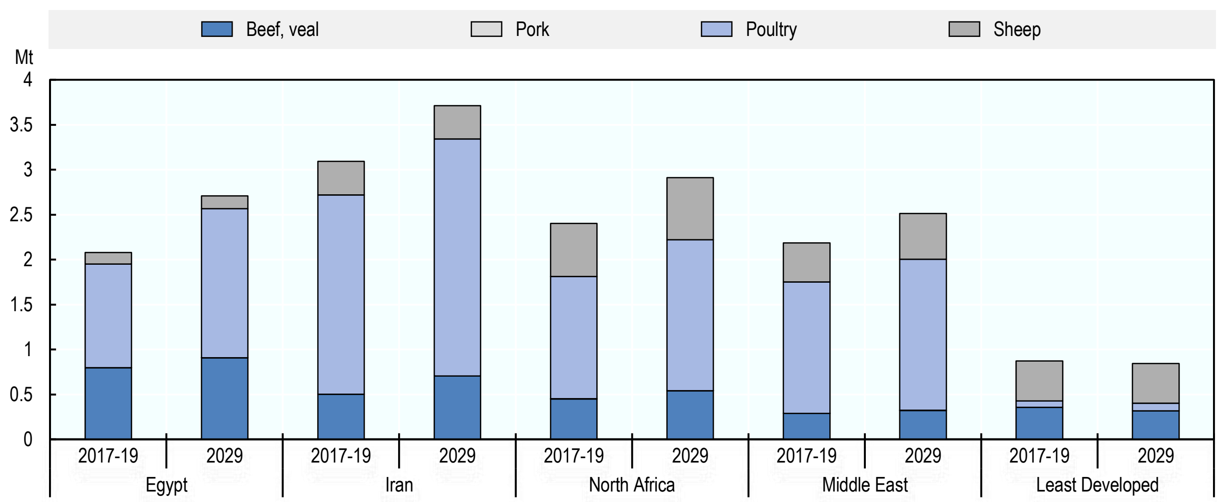


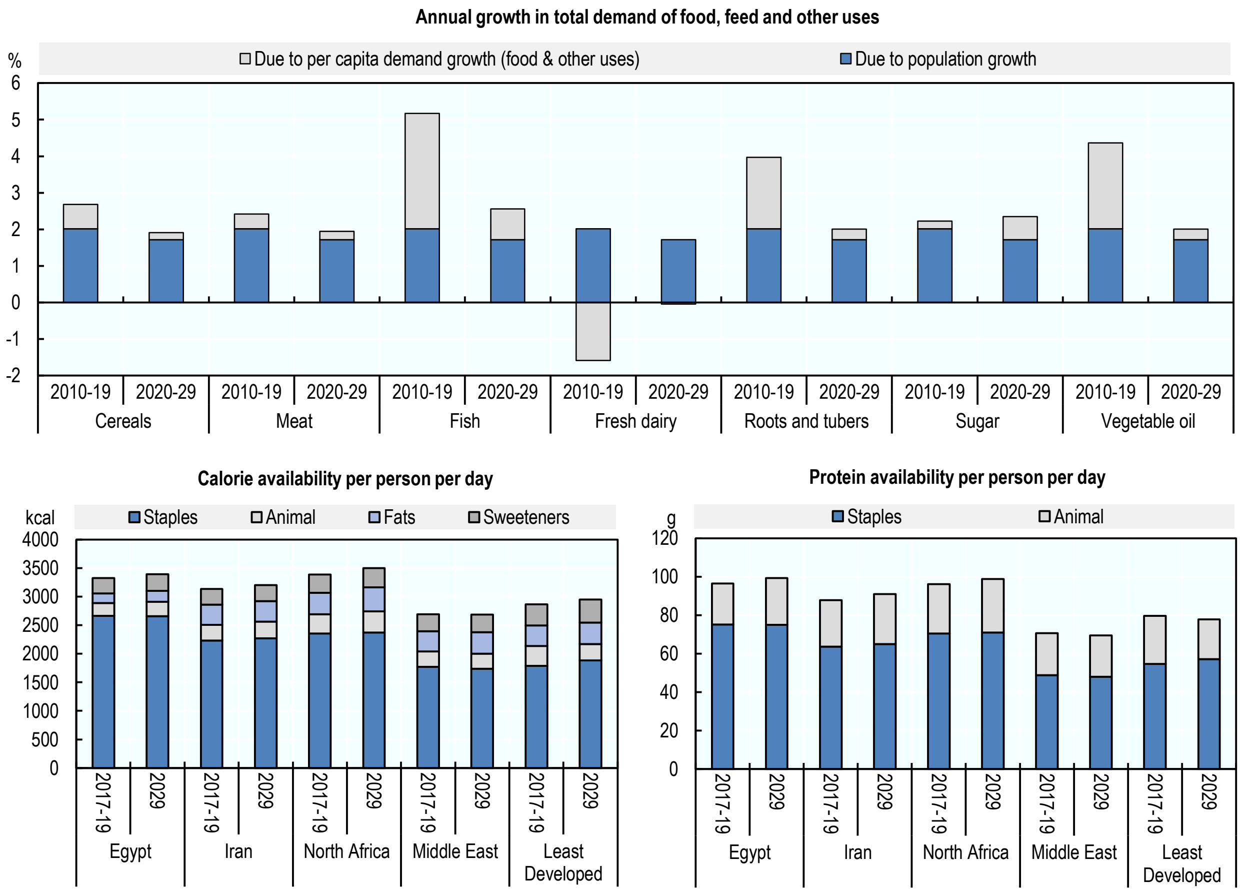
Figure 2.15. Livestock production in Near East and North Africa



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

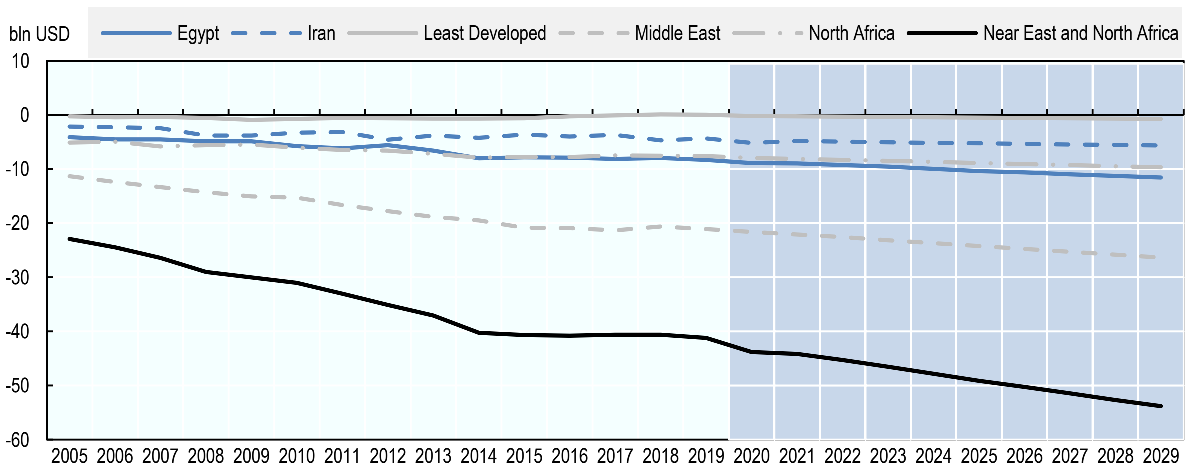
StatLink https://doi.org/10.1787/888934141874

Figure 2.16. Demand for key commodities and food availability in Near East and North Africa



Note: Upper panel - population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.17. Agricultural trade balances in Near East and North Africa



Note: Net trade (exports minus imports) of commodities covered in the Agricultural Outlook, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141893

Table 2.3. Regional indicators: Near East and Northern Africa

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	399 638	487 741	578 229	18.55	1.93	1.53
Per capita GDP[1] (kUSD PPP)	10.05	10.48	11.45	9.20	0.33	1.00
Production (bln USD)						
Net value of agricultural and fisheries[3]	94.9	112.7	133.4	18.32	1.62	1.64
Net value of crop production[3]	14.2	15.8	17.9	13.56	1.09	1.27
Net value of other not incl. crop production[3]	47.2	55.4	67.0	20.89	1.57	1.85
Net value of livestock production[3]	25.7	27.8	32.1	15.61	0.29	1.38
Net value of fish production[3]	7.9	13.8	16.4	18.88	5.88	1.71
Quantity produced (kt)						
Cereals	64 858	71 540	78 562	9.82	0.97	0.98
Pulses	1 970	2 708	3 187	17.70	2.41	1.57
Roots and tubers	3 210	4 670	5 721	22.49	2.79	1.81
Oilseeds[4]	1 584	1 720	2 023	17.56	1.91	1.49
Meat	8 715	10 628	12 696	19.46	1.71	1.56
Dairy[5]	4 460	4 245	4 926	16.05	-1.11	1.51
Fish	3 822	6 713	7 978	18.84	5.90	1.71
Sugar	3 769	5 509	7 971	44.71	4.51	2.82
Vegetable oil	1 671	2 731	3 615	32.38	6.35	2.08
Biofuel production (Mn L)						
Biodiesel	0.02	0.02	0.02	13.93	0.00	1.36
Ethanol	257.8	170.2	191.9	12.76	-5.34	1.69
Land use (kha)						
Total agricultural land use	477 583	473 135	473 943	0.17	-0.20	0.02
Total land use for crop production[6]	80 622	77 009	77 908	1.17	-1.03	0.11
Total pasture land use[7]	396 961	396 126	396 035	-0.02	-0.03	0.00
Direct GHG Emissions (Mt CO2-eq)						
Total	249	199	204	2.62	-2.04	0.33
Crop	67	37	37	1.85	-4.84	0.46
Animal	181	162	167	2.79	-1.27	0.30
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2972	3049	3090	1.34	-0.04	0.13
Daily per capita protein availability[8](g)	84	85	85	0.84	-0.32	0.10
Per capita food availability (kg)						
Staples[9]	221.5	220.5	218.1	-1.09	-0.01	-0.13
Meat	24.2	25.3	25.9	2.29	-0.04	0.30
Dairy[5]	13.4	11.6	11.6	0.44	-1.80	0.33
Fish	9.0	12.4	14.0	12.57	2.27	1.10
Sugar	32.2	32.9	35.0	6.37	0.36	0.64
Vegetable oil	11.5	13.7	14.7	6.99	2.46	0.63
Trade (bln USD)						
Net trade[3]	-28.5	-40.8	-53.8	31.91	..	..
Net value of exports[3]	6.2	8.9	8.5	-4.68	3.02	-0.27
Net value of imports[3]	34.7	49.7	62.3	25.38	3.08	2.03

	Average		2029	%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	47.2	40.7	36.4	-10.45	-1.46	-0.73
Meat	74.9	71.9	70.8	-1.47	-0.14	-0.26
Sugar	28.1	34.3	39.0	13.61	2.30	0.63
Vegetable oil	23.2	24.6	26.6	7.85	1.88	0.35

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

2.5. Regional outlook: Europe and Central Asia

Background

Europe and Central Asia[8] is a diverse region that includes the European Union, United Kingdom, Russian Federation, Ukraine, and Turkey as the main agricultural producers. There is considerable variation across its countries in terms of stage of development, demographics, agricultural resources and public policies. The region's population is slowly growing; static in Western Europe, shrinking in Eastern Europe, growing at just less than 1% p.a. in Central Asia. The region is highly urbanised and by 2029 75% of its population will live in urban environments.

Average income in the region is greater than USD 25 000, but there are substantial differences across countries. While the economies of Western Europe are diverse, those in more eastern regions are focused on commodities, particularly in the Russian Federation where oil and gas are critical sectors. The share of primary agriculture, forestry and fish production in total GDP is low, ranging from just 1.4% in the European Union, to 11% in Ukraine. It is estimated that the share of food in household expenditures averaged about 12% in the region in 2017-19 base period, ranging from around 6% for United Kingdom to around 21% in Central Asian countries such as Kazakhstan.[9]

The region produces 17% of the global value of agricultural and fish production, a share which has been declining over time, largely due to slow growth in Western Europe over the past 20 years. Crop production averages about 56% of the net value of total production, fish about 8%, and livestock the remainder of about 36%. Whereas the region accounted for 12% of the total growth in the global net value of agriculture and fish in the last decade, it accounted for 22% of growth in global exports. This growing export orientation is largely driven by Eastern Europe where productivity levels in both the crop and livestock sectors have improved but static population and relatively mature consumption levels mean demand growth has been weak. Trade within the region is affected by various uncertainties, notably concerning the outcome of negotiations to determine future trading arrangements between the United Kingdom and the European Union and the Russian embargoes on imports from the European Union that have been continuously renewed since 2014.

Relative to other regions, livestock and animal products are important in both production and consumption. They constitute one third of the net value of agriculture and fish production. On the consumption side, calories and proteins from animal products comprise 21% and 51% respectively of total availability. The subregion of Western Europe is a very large producer, consumer and trader of milk and dairy products, and while its share of global milk production is falling over time, production and trade of high value products such as cheese are growing. Per capita fresh dairy product consumption is twice the world average and cheese in particular is four times higher.

Production

The net value of agriculture and fish production (net of feed and seed inputs) is projected to grow 8% by 2029 compared to the base period average of 2017-19, with Western Europe growing by less than 2% compared to growth in Eastern Europe of 18% and Central Asia of 19%. Eastern Europe’s strong growth will be led by the Russian Federation and Ukraine at 12% and 26% respectively, driven by strong growth in the crop sectors of these countries, although the Russian sector is anticipated also to show strong growth in meat production, given the impact that import embargoes have had on domestic markets to stimulate local production.

Productivity improvements will underlie growth in the sector, with agricultural land use in the region projected to continue its contraction of the last ten years. By 2029, a marginal increase in cropland use is projected to be more than offset by a reduction in pasture area. In relation to changes in land use, direct GHG emissions from agriculture are projected to decline 2% over the next decade.

Crop production in the region is expected to expand by 11% over the next decade, accounting for more than half of the region’s growth in agricultural and fish production. This expansion will be largely due to rising cereals and oilseeds output in the Black Sea region. The Russian Federation and Ukraine are projected to sustain robust growth in maize, wheat, soybean and other oilseeds to increase their share in regional production to 38% for maize, 36% for wheat and 54% for all oilseeds. Yield improvements will drive nearly all production growth in these commodities.

Livestock production is projected to grow more slowly at 0.6% p.a. over the next decade, and will be based on intensified production resulting in higher carcass weights. Nonetheless, a slower expansion of meat production is expected to take place, as demand for meat will remain stagnant for bovine and porcine meats. Poultry production is expected to rise across the region over the outlook period. Most poultry will be produced to supply the domestic market and per capita consumption will rise by nearly 2 kg/capita to an average consumption of 28 kg/capita per year.

Production of dairy products is projected to accelerate, with a more rapid expansion of cheese and whole milk powder relative to the last decade. Domestic food demand for dairy products will remain strong, contributing 22% of daily calories toward diets across the region. However, the dairy output expansion will increasingly feed international demand – an increasing share of the region’s butter, cheese and milk powders is expected to be exported over the next decade. The region will remain a leading source of dairy production in the world, led largely by Western Europe whose global share of milk production still exceeds 20%. The region as a whole will account for 40% of global cheese and skim milk power production, and over 25% of global butter production by 2029.

Consumption

Daily per capita calorie availability in the region is projected to increase by 45 kcal/day to almost 3 430 kcal/day mainly due to increases in cereal and pulse consumption, and small increases in meat and dairy products. Food demand for sugar is projected to continue to contract as consumers in Europe seek to curb high consumption levels amid increasing health consciousness. Western Europe’s sugar consumption per capita is projected to fall by 1 kg per year to 34 kg in 2029, but this is still over 40% higher than the world average. Vegetable oil consumption is also expected to fall marginally over the next decade reducing its contribution to regional diets.

Protein availability per capita in the region is projected to increase by 3 g/day to 105 g/day by 2029, which is almost 25% higher than the world average of 85 g/day. Pulse consumption, which has been rising rapidly from a low base in the last decade given its positive health image, is projected to rise 12% to 4kg per capita by 2029. Per capita meat consumption may rise slightly to 57 kg/capita per year, largely due to higher poultry meat consumption, which is anticipated to be the fastest growing meat item, reaching 28 kg per capita. Bovine and pigmeat consumption per capita is anticipated to decline over the period. Fish consumption is projected to rise slowly over the outlook period, with per capita levels 2.2 kg below the global average.

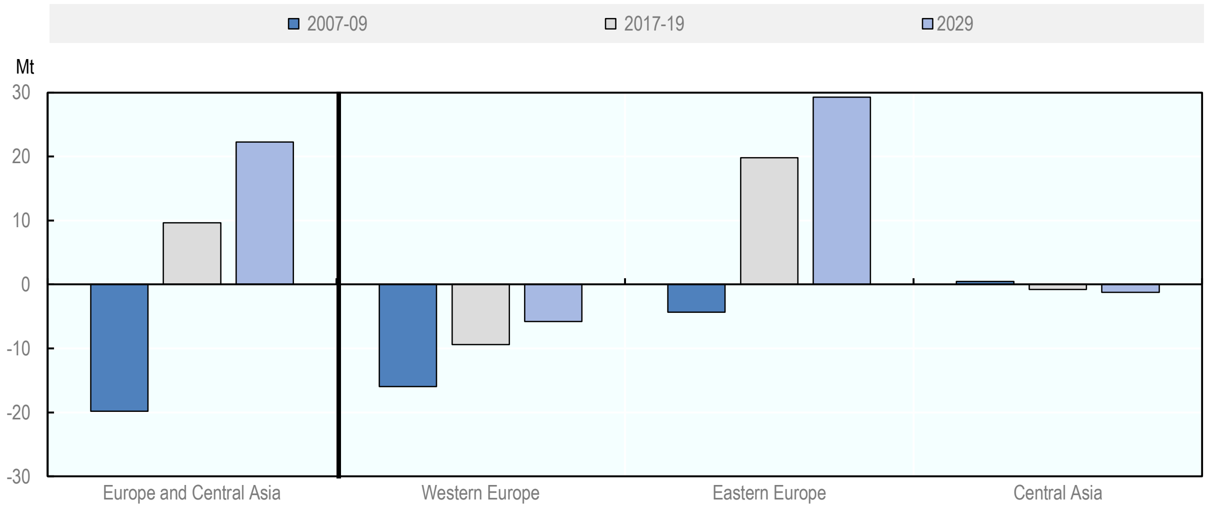
Owing largely to the importance of animal products, the region consumes almost one quarter of global protein feed. With slow growth projected for the livestock sector, with an increasing poultry, but declining pigmeat sector, feed use is anticipated to increase only 4% by 2029 over the base period, with increases in maize and protein meals offset by a decline in wheat feed.

Non-food demand for vegetable oil is expected to contract as its role in biofuel production in the European Union will diminish. The region is moving towards second generation – non-food – feedstocks for biodiesel and is also decreasing its demand for diesel. The region’s production of biodiesel is therefore projected to contract 10% by 2029, reducing its share of global biodiesel production from 36% to 28%.

Trade

Prior to 2014, the region as a whole was a large net importer of agricultural commodities. However, due to rising exports from Eastern Europe, particularly Russian Federation and Ukraine, the region is emerging as the third main net-exporting region of the world. The reasons for this are rising productivity, but also slow domestic demand growth given already high consumption levels, and slow population growth. With a large land base, both Eastern Europe and Central Asia have a comparative advantage in cereal and oilseed production.

Figure 2.18. Net exports of agriculture and fish products from Europe and Central Asia



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141912

The region's cereal exports will grow from 151 Mt in the base period to 193 Mt in 2029, an increase of 28%, with the Near East and North Africa region as a major importer. Its market share in cereal exports is projected to reach 38%, its highest ever. The region's wheat export share will rise to 56%, with exports of 117 Mt. Maize exports may reach almost 50 Mt, or 25% of world maize trade by 2029. On the import side, soybean and protein meal imports are anticipated to remain steady around 27 Mt and 32 Mt, respectively, keeping the region one of the major importers of these products.

The region is a major gross exporter pigmeat and poultrymeat with global shares of 43% and 27% respectively. However, with extensive internal regional trade these shares on a net export basis fall to 23% and 8%, indicating the importance of internal trade to the region. In this context, the future status of the Russian Federation's import embargo will affect trade inside and outside the region. The region is the most important dairy product exporter, with shares in global dairy products remaining high or rising, with cheese, SMP and butter exports reaching 63%, 42% and 47% respectively.

Figure 2.19. Change in area harvested and land use in Europe and Central Asia

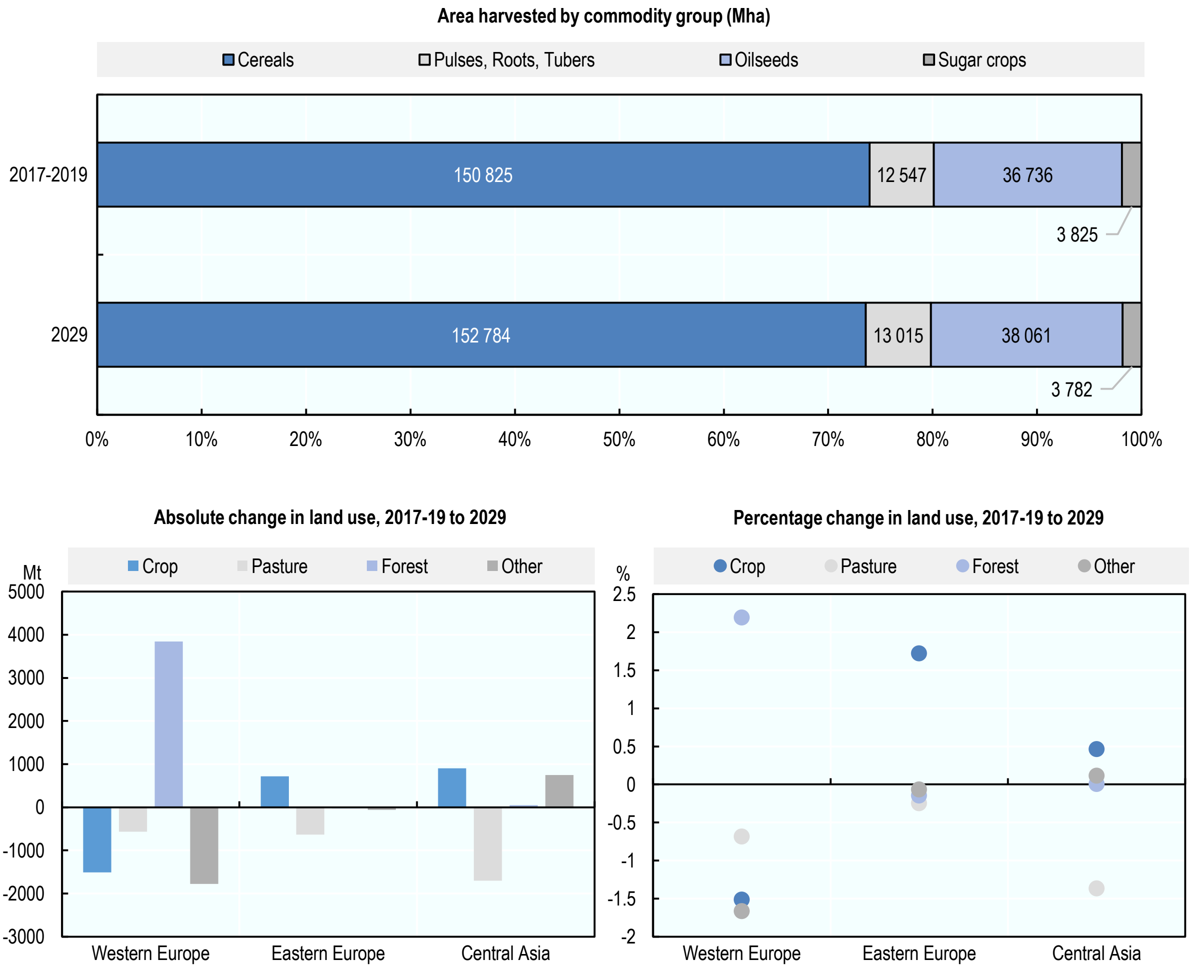
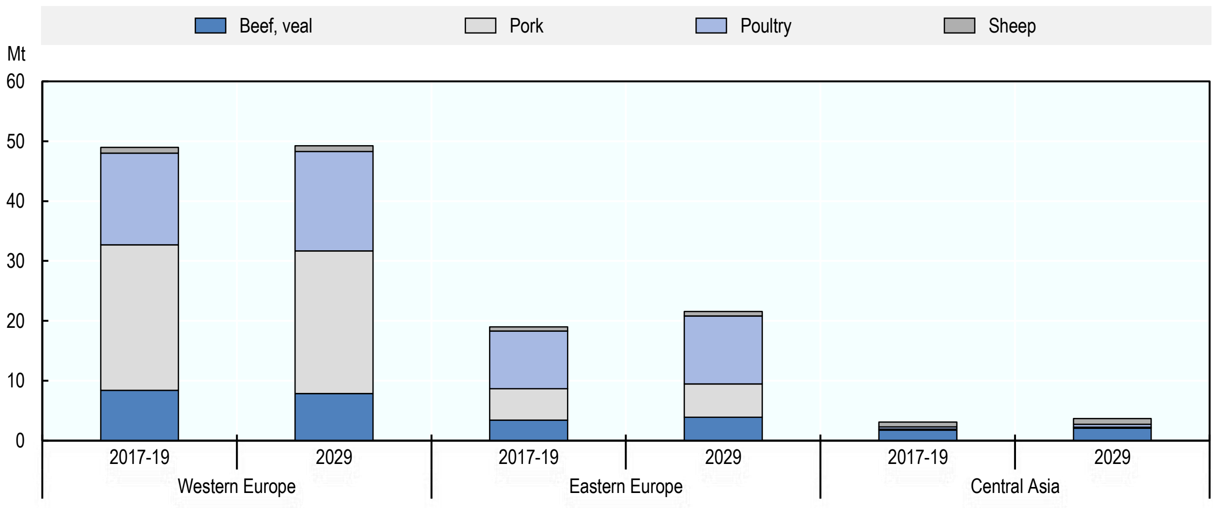
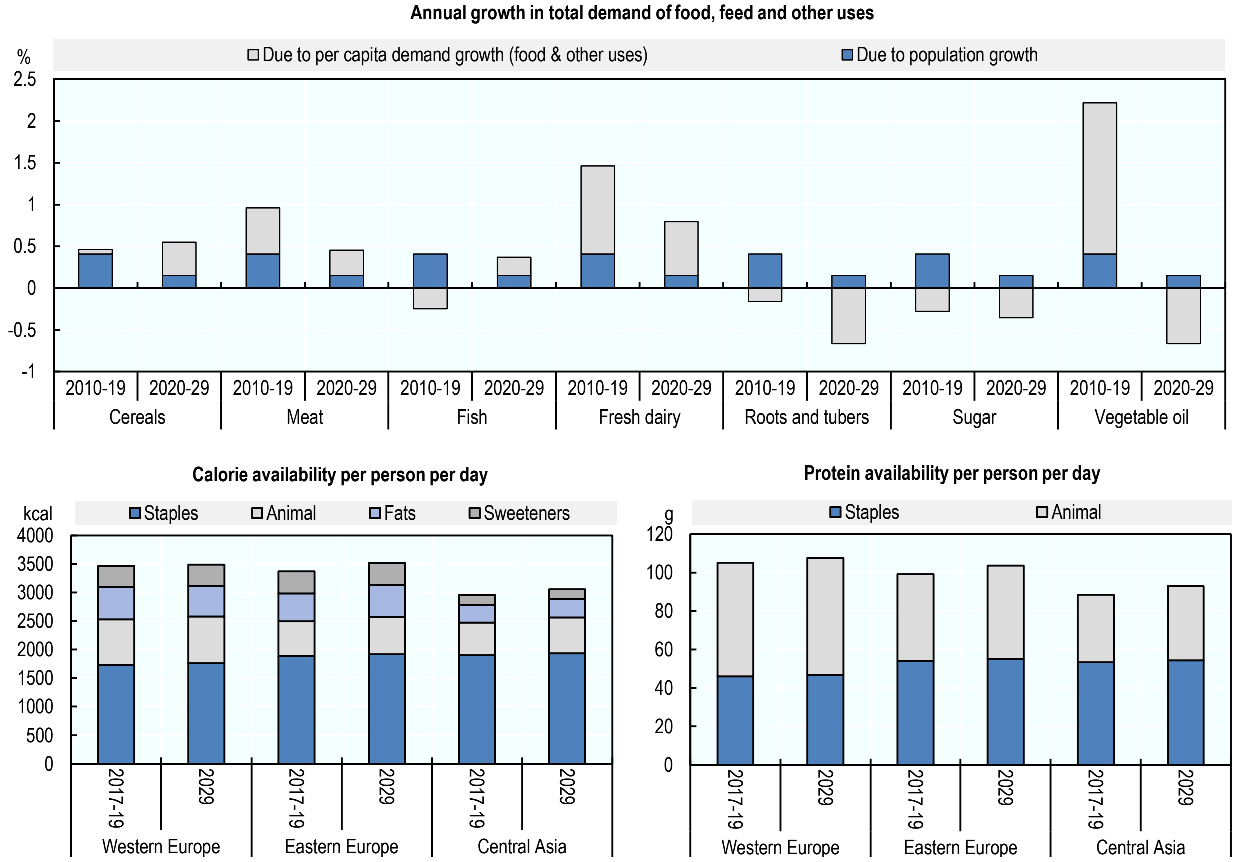


Figure 2.20. Livestock production in Europe and Central Asia



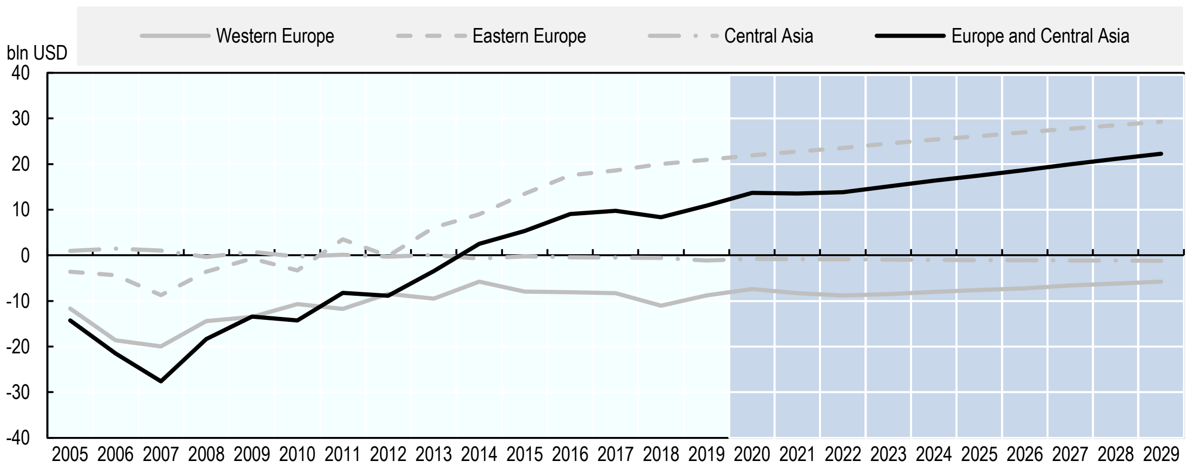
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 2.21. Demand for key commodities and food availability in Europe and Central Asia



Note: Upper panel – population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.22. Agricultural trade balances by region



Note: Net trade (exports minus imports) of commodities covered in the Agricultural Outlook, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141931

Table 2.4. Regional indicators: Europe and Central Asia

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	889 018	925 930	940 149	1.54	0.41	0.09
Per capita GDP[1] (kUSD PPP)	24.48	27.28	32.65	19.70	1.45	1.73
Production (bln USD)						
Net value of agricultural and fisheries[3]	406.0	465.1	504.0	8.36	1.42	0.68
Net value of crop production[3]	104.4	125.9	141.2	12.19	2.76	1.06
Net value of other not incl. crop production[3]	125.0	130.8	140.5	7.49	-0.14	0.63
Net value of livestock production[3]	142.3	169.0	180.4	6.73	1.77	0.45
Net value of fish production[3]	34.3	39.4	41.8	6.02	1.50	0.63
Quantity produced (kt)						
Cereals	513 673	581 353	650 784	11.94	2.33	1.00
Pulses	6 709	9 562	12 411	29.79	3.15	2.32
Roots and tubers	28 765	29 623	28 355	-4.28	1.23	-0.19
Oilseeds[4]	47 484	78 291	88 449	12.97	5.01	1.16
Meat	58 664	71 099	74 480	4.75	1.99	0.28
Dairy[5]	24 314	28 971	32 207	11.17	1.75	0.98
Fish	16 785	19 228	20 376	5.97	1.49	0.63
Sugar	25 279	31 270	31 832	1.80	1.91	0.90
Vegetable oil	21 709	32 944	36 039	9.40	4.12	0.87
Biofuel production (Mn L)						
Biodiesel	7 956	15 522	13 908	-10.39	4.48	-1.22
Ethanol	5 325	8 264	8 120	-1.74	2.02	-0.65
Land use (kha)						
Total agricultural land use	802 550	801 440	798 650	-0.35	-0.05	-0.03
Total land use for crop production[6]	339 702	335 102	335 213	0.03	-0.02	-0.01
Total pasture land use[7]	462 848	466 339	463 437	-0.62	-0.08	-0.05
Direct GHG emissions (Mt CO2-eq)						
Total	682	708	696	-1.69	0.60	-0.15
Crop	197	216	211	-2.55	1.05	-0.17
Animal	485	492	485	-1.30	0.41	-0.14
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 332	3 383	3 451	2.01	0.20	0.25
Daily per capita protein availability[8](g)	100	102	105	3.15	0.11	0.30
Per capita food availability (kg)						
Staples[9]	168.8	170.1	172.3	1.27	0.15	0.12
Meat	55.1	58.7	60.7	3.38	0.80	0.30
Dairy[5]	24.5	27.4	29.5	7.81	1.12	0.73
Fish	18.9	18.3	19.2	4.72	-0.10	0.44
Sugar	36.0	35.0	33.7	-3.50	-0.65	-0.19
Vegetable oil	22.0	24.3	23.9	-1.49	2.95	0.45
Trade (bln USD)						
Net trade[3]	-19.8	9.7	22.3	130.59	..	..
Net value of exports[3]	53.9	86.4	100.0	15.76	4.56	1.22
Net value of imports[3]	73.8	76.7	77.7	1.29	0.52	0.13

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	108.5	119.0	126.6	6.3	1.21	0.42
Meat	95.3	105.0	105.1	0.1	0.86	-0.09
Sugar	80.7	96.3	100.2	4.0	2.54	1.01
Vegetable oil	73.2	89.9	103.2	14.7	1.47	1.03

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.6. Regional outlook: North America

Background

As a region comprising of just two highly developed countries, it is not entirely appropriate to compare it with the other regions of this *Outlook*, which are more diverse composites. However, the importance of the region in global agriculture is notable. While it comprises about 5% (365 million people) of the global population, it produces 10% of global agricultural and fish output. It has the most agricultural land per person and the highest per capita value of agricultural and fish production. For the commodities of this outlook, the region also has the largest commodity trade surplus, with exports per person at twice the global average. Nevertheless, the role of North America in global agriculture is diminishing over time as other regions are growing more quickly. The share of agriculture and fish (including forestry) in its GDP is likely to its slide below 1%.

Agricultural production in North America uses inputs intensively, particularly fixed capital, as it is produced to a significant degree on large commercial units. As a result, the region has very high partial factor productivities as measured by crop yields, livestock/meat off-take ratios and milk yields. Agricultural land use has been declining in the last decade, as that for crops declined by 3.5%, but yields have continued to increase such that crop production has increased almost 14%. Animal production is very important in the region, contributing just over one third of its net value of agricultural production. This compares to the global average share of livestock of 28%. However, livestock inventory is proportionately lower given its high productivity. For example, bovine meat production per animal in inventory is over three times the global level. The region is a comparatively small producer of fish compared to other regions, with a current 4% and falling production share of global production.

Food consumption per capita in the region is the highest of all regions, encouraged by the highest per capita income (USD 61 000) and the highest urbanisation rate (82%) which affect both the level and composition of food intake. With real per capita incomes projected to decline marginally over the next decade, population growth at 0.6% p.a. and possible changes in dietary preferences are likely the main factors influencing food demand over the outlook period. While estimates include considerable food waste, calorie and protein availabilities in the region already average 3 760 kcal/capita per day and 113 g/capita per day, some 30% and 37% higher than the global average. Food intake is proportionately high in animal products, with a calorie and protein shares of 25% and 63% respectively, compared to global averages of 16% and 37%. North Americans consume copious amounts of vegetable oil and sweeteners, with calorie shares of 19% and 15% compared to the global averages of 10% and 7% respectively. The

North American diet has led to increasing problems of obesity and incidence of food related non-communicable diseases such as diabetes. However, despite this level of aggregate consumption, food insecurity is estimated to be experienced by 10-12% of the region's population.

North America (specifically the United States) is the largest bio-fuel producing region, with a production share of global output exceeding 40%, primarily consisting of ethanol derived from maize feedstocks, and to a much lesser extent, biodiesel derived from soybean oil. Production has nevertheless been largely policy driven, and with mandates largely filled at blending rates near the blend wall for transportation fuels, and in the context of oil price projections, the era of rapid growth in biofuel production appears to be over.

Production

Agricultural and fish production in the region is projected to expand slowly ear over the next ten years, with output rising by 7%, compared with a rise in the last decade of twice that rate. The general cause of slowing growth is low or sluggish real prices for the main crop and livestock commodities, strength in the US dollar relative to competitive countries, and trade policy which is seen to limit the growth in trade.

After declining in the last decade, land under crop production in the region is projected to fall a further 3.5% by 2029. Land use in cereal production is projected to remain largely unchanged at 38% of total crop use, while land use in oilseeds will fall 2% and that in other crops continue to fall over 10%. The largest gain is for pulses, which may enjoy a rise 6% after a large 80+% rise in the last decade. Total area harvested in the region is expected to remain stagnant, falling about 1% by 2029 compared to the base period. Total crop output in quantity terms will rise to 774 Mt, up 8% from the base period, will be met by yield improvement in the range of 9% for cereals to 11% for oilseeds.

With declining real prices and despite low feed costs, total meat production will rise to 55 Mt by 2029, up just 8.5% over the base of the last three years. Sheep-meat is expected to be the fastest growing meat sector, but from a very low base. The poultry sector will increase its dominance among meats, growing by 10%, to attain a production share in the region of 47% by 2029, as it takes advantage of low feed costs, and relatively firm demand. The bovine meat sector is expected to be the slowest growing subsector under weak domestic demand.

An increase in milk production of 9.5% will be achieved by growth in dairy cow milk yields of 9%, as dairy herds remain largely static, following the trends of recent years. Of the increase in milk production, an increasing share of milk will be allocated to processed dairy products, and less to fluid milk products where production is anticipated to fall over the outlook period following the lead of consumer preferences.

Fish production in North America, which is dominated by capture fish production (90%), is expected to remain flat over the outlook period as declines in capture fish production are offset by rapid gains in aquaculture (25%), as the latter sector continues to develop from a low base, encouraged by low feed prices and firm demand for fish.

Total GHG emissions from agriculture are expected to continue to grow at the rate of the previous decade, and will be 2.5% higher in 2029 than in the base period. Emissions from livestock activities show less growth given declining ruminant inventories. Emissions from the crop sector, however, are projected to increase almost 3% by 2029.

Consumption

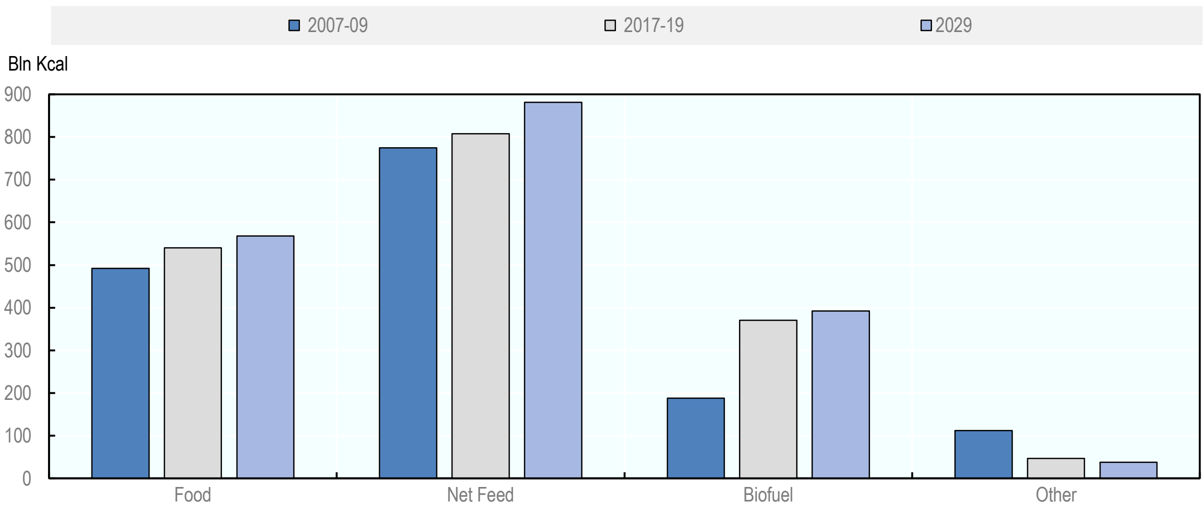
Movements in food consumption on a per capita basis in the region will largely be determined by adjustments in preferences, which are projected to be minor. As measured by calorie availability, food consumption in North America is set to remain at high levels, but will decline marginally over the medium term by some 38kcal/capita per day to 3 725 kcal per day, as the trend declines in sweeteners (-48 kcal) and cereals (-24 kcal) offset the rise in animal products (13 kcal), vegetable oil (3 kcal) and products which are not included in the *Outlook* such as fruits and vegetables. The projected decline in calorie availability is less pronounced in the United States (-29 kcal) than in Canada (-112 kcal), where the latter may see a larger fall in cereals and sweeteners and a fall in vegetable oils.

Protein intake in the region will remain flat at 113 g/day with the split between animal and vegetal sources remaining at 63%/37% respectively. In the meat sector, consumption is expected to rise further, increasing by 1.4 kg/capita per year due largely to higher poultry but lower bovine meat consumption. Lower intake of proteins from dairy products is anticipated, largely due to a decline in fresh dairy products which follows trend changes of the past decade. Fish consumption is projected to increase modestly. The trend decline in cereal consumption will modestly reduce protein availability from the major staples.

Feed use in the region is a significant user of agricultural output, consuming more energy/calories than final food use (Figure 2.23). Following livestock production, total feed use is projected to rise over 9% to 292 Mt by 2029, with shares from sources of maize (including distiller-dried grains) and protein meal rising slowly over time to 68% and 16% over the period.

Feedstocks used in biofuel production in the region use about 70% of energy/calories from agricultural output as are used in final food use. Ethanol production in the region is projected to reach 65.5 billion litres up almost 6% by 2029, as the prices and policies encourage biofuel use. Growth in biodiesel production is anticipated to remain flat. The outlook for biofuel is heavily contingent on developments in the energy sector, and biofuel policies in the region.

Figure 2.23. Calories used in food, feed, biofuel and other use in North America



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141950

Trade

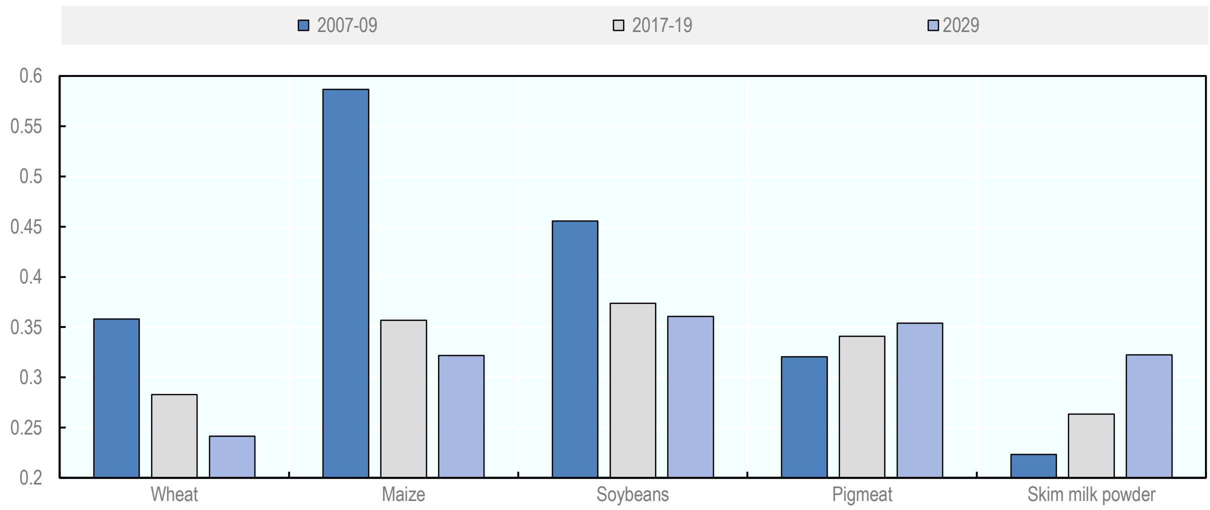
While the trade surplus grew over 30% in the last decade, the region's position as the largest net exporter globally was been overtaken by the LAC region and that is expected to prevail over the outlook period. Growth in net exports is projected to be only 14%. Both exports and imports will register slower growth. Reasons for slower growth relate to both weakening domestic and foreign demand, affected to some degree by a higher US dollar. Trade relations, particularly between the United States and China, will substantively affect the region as bilateral trade has been significant. Recent agreements between these two countries could set the basis for resumed and potentially expanded trade opportunities. The

United States-Mexico-Canada (USMCA) Agreement, replacing the North American Free Trade Agreement (NAFTA), will improve intra-regional trade, especially for certain dairy products.

The volume of exports, measured at international commodity prices in 2004-06, is projected to rise 11% compared to an increase in the last decade of 25%. Reasons for slower growth compared to the base period also relate to largely soybean exports which have not regained their peak before China imposed tariffs and to pigmeat where the rapid rise in the past decade will taper over the period. The region has lost considerable trade share in recent times for cereals and oilseeds, and this trend is anticipated to continue given higher competition from both the Latin America and Caribbean and from Central Asia regions (Figure 2.24). At the same time, rising shares for pigmeat and skim milk powder are expected to continue.

Relatively, the region is not a large importer of agricultural commodities covered in this *Outlook*, and much of that is intra-regional trade (which is not monitored in this *Outlook*). Imports are projected to slow, growing by only 4% to 2029. The region used to be a large net importer of bovine meat, and while it still has a large share of world imports (18%), the region became a net exporter in the last decade and this trend is expected to continue. The region remains a relatively large importer of fish, with a share on global markets of 14%, and imports are set to grow by 4% by 2029.

Figure 2.24. Trends in export market shares of selected commodities of North America



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Figure 2.25. Change in area harvested and land use in North America

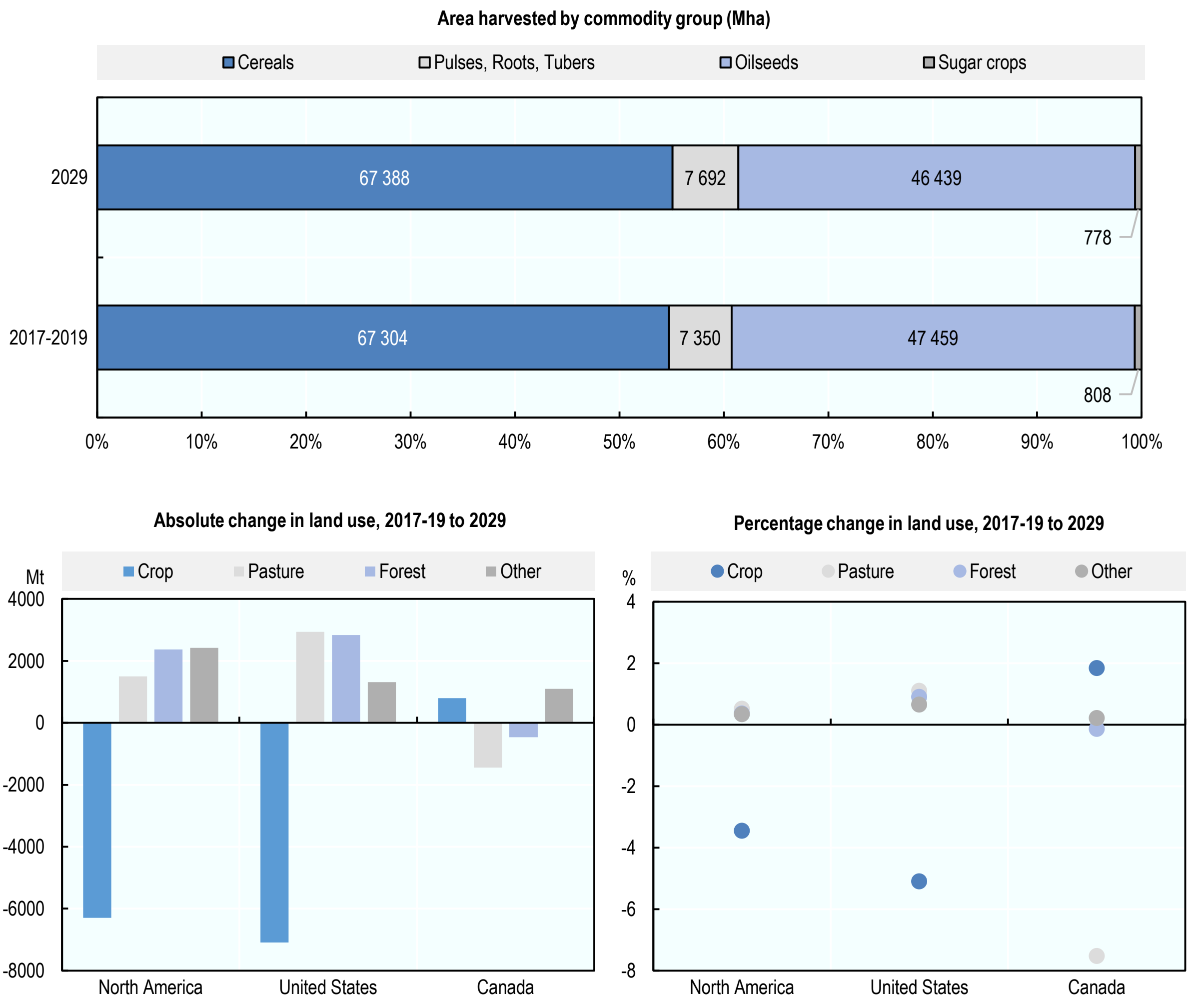
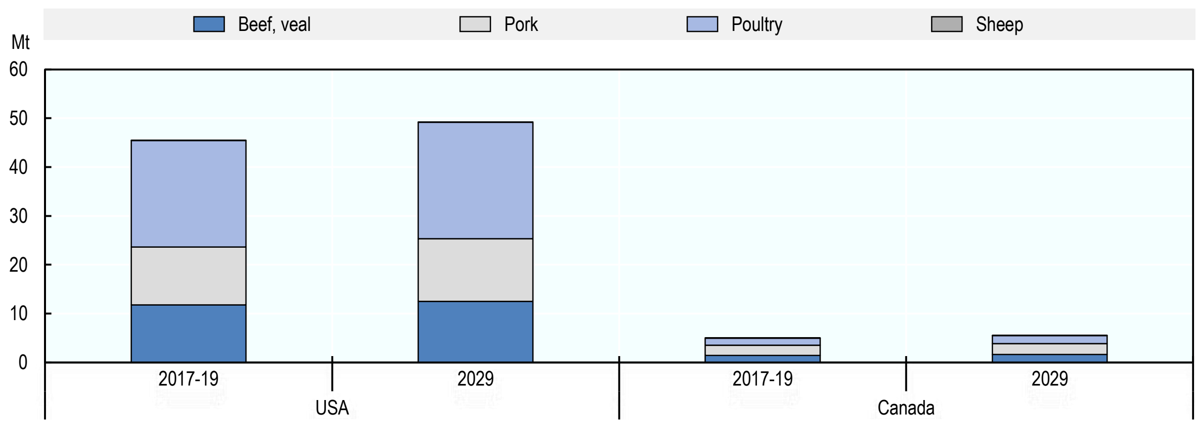
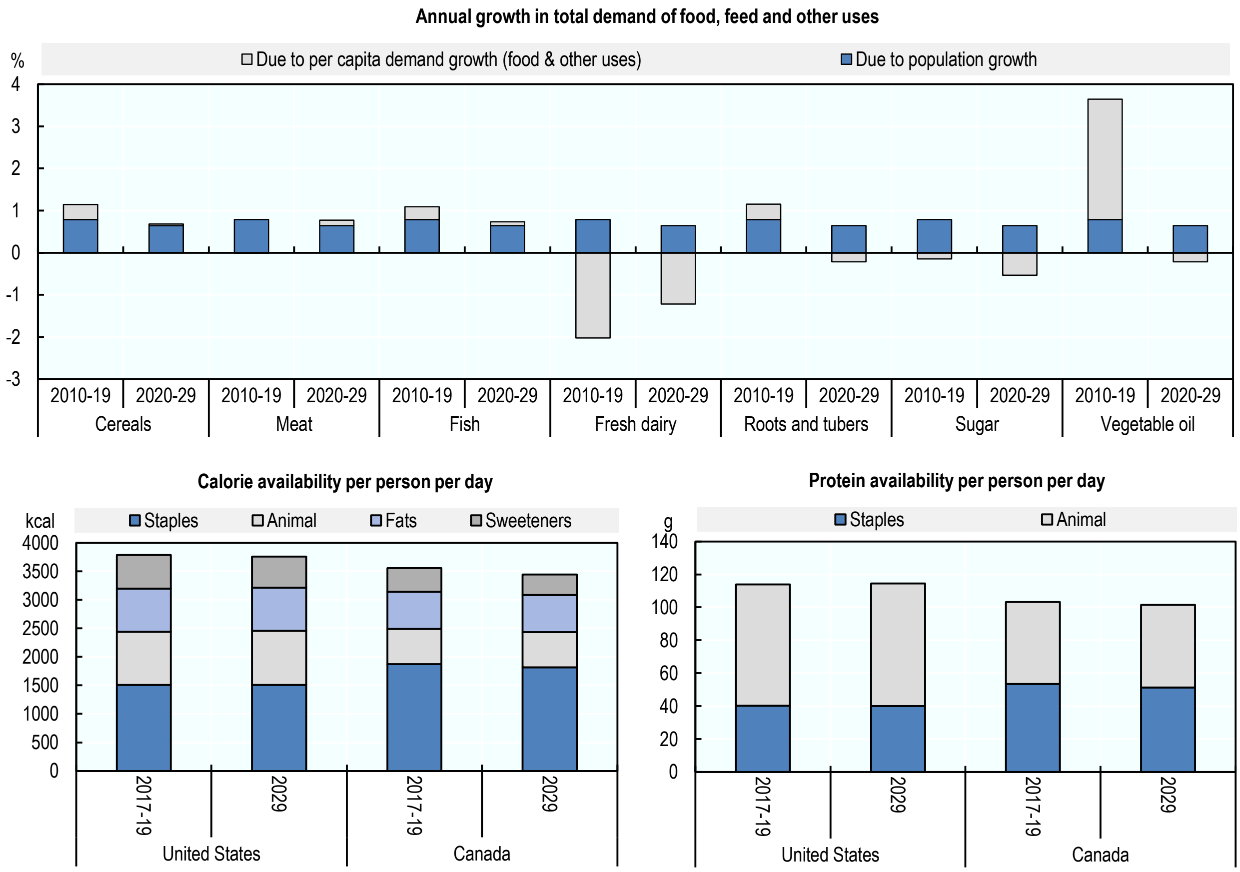


Figure 2.26. Livestock production in North America



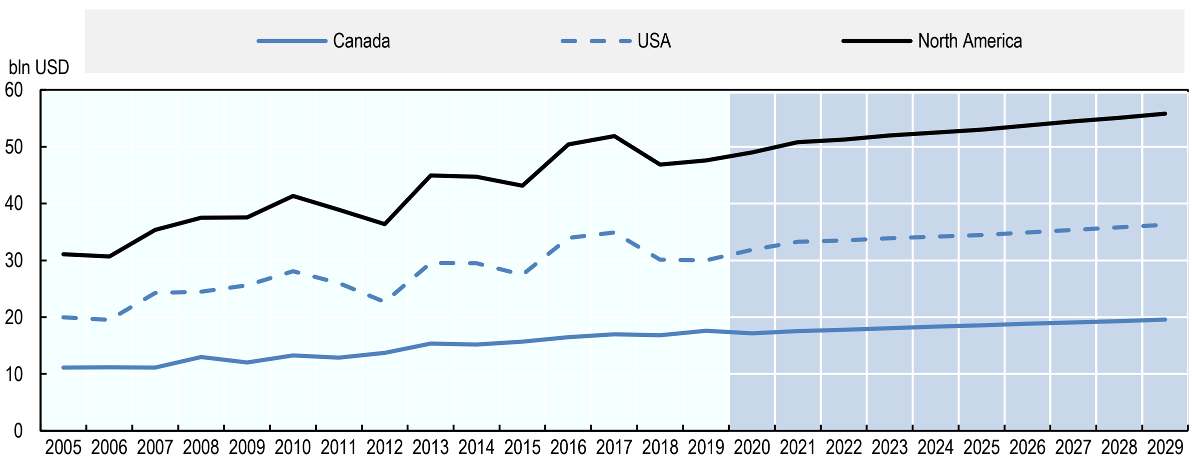
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 2.27. Demand for key commodities and food availability in North America



Note: Upper panel - population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.28. Agricultural trade balances in North America



Note: Net trade (exports minus imports) of commodities covered in the Agricultural Outlook, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934141988

Table 2.5. Regional indicators: North America

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	336 806	364 155	388 334	6.64	0.73	0.58
Per capita GDP[1] (kUSD PPP)	49.06	54.97	66.69	21.32	1.73	1.76
Production (bln USD)						
Net value of agricultural and fisheries[3]	247.2	281.0	302.7	7.74	1.49	0.61
Net value of crop production[3]	104.7	124.1	135.1	8.87	2.46	0.77
Net value of other not incl. crop production[3]	50.0	52.1	54.6	4.82	0.01	0.37
Net value of livestock production[3]	80.0	91.7	99.3	8.23	1.31	0.52
Net value of fish production[3]	12.5	13.0	13.7	5.22	0.09	0.60
Quantity produced (kt)						
Cereals	461 061	489 325	532 605	8.84	1.73	0.61
Pulses	6 882	10 282	12 012	16.82	4.40	1.37
Roots and tubers	5 095	5 498	5 687	3.45	1.18	0.20
Oilseeds[4]	100 105	144 163	155 822	8.09	3.81	0.91
Meat	45 564	50 483	54 725	8.40	1.42	0.49
Dairy[5]	8 836	10 100	11 290	11.79	1.24	1.05
Fish	6 098	6 349	6 680	5.22	0.08	0.59
Sugar	6 696	7 475	7 684	2.80	0.75	0.46
Vegetable oil	12 855	17 876	18 818	5.27	3.62	0.64
Biofuel production (Mn L)						
Biodiesel	2 207	8 722	8 701	-0.24	17.45	-2.57
Ethanol	35 324	61 999	65 521	5.68	2.39	0.44
Land use (kha)						
Total agricultural land use	476 639	467 356	462 559	-1.03	-0.15	-0.09
Total land use for crop production[6]	192 958	182 412	176 118	-3.45	-0.46	-0.31
Total pasture land use[7]	283 680	284 944	286 441	0.53	0.05	0.05
Direct GHG Emissions (Mt CO2-eq)						
Total	404	416	427	2.59	0.46	0.21
Crop	144	157	162	2.93	0.71	0.16
Animal	261	259	265	2.38	0.31	0.24
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 677	3 764	3 726	-1.00	0.47	-0.03
Daily per capita protein availability[8](g)	74	81	85	5.36	0.92	0.54
Per capita food availability (kg)						
Staples[9]	142.4	140.7	136.5	-2.95	-0.05	-0.24
Meat	95.8	96.5	97.8	1.44	0.84	-0.01
Dairy[5]	23.8	24.3	24.4	0.55	0.25	0.08
Fish	22.2	22.4	22.8	1.61	0.47	0.22
Sugar	31.4	31.0	29.4	-5.17	-0.76	-0.38
Vegetable oil	34.4	39.2	39.0	-0.56	1.20	0.60
Trade (bln USD)						
Net trade[3]	36.8	48.8	55.8	14.39	2.87	1.31
Net value of exports[3]	61.6	76.8	84.9	10.56	2.41	0.99
Net value of imports[3]	24.8	28.0	29.1	3.89	1.67	0.39

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	129.6	128.2	128.1	-0.09	0.15	0.09
Meat	112.5	115.2	115.8	0.52	-0.09	-0.07
Sugar	63.4	66.3	67.4	1.57	1.15	0.26
Vegetable oil	99.8	98.5	98.5	-0.05	-0.45	0.41

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.7. Regional outlook: Latin America and the Caribbean

Background

Latin America and the Caribbean[10] region comprise about 8.5% of the global population and will add another 60 million people by 2029. Its urban population will grow by 66 million people, pushing the rate of urbanisation to 83%, which is the highest among developing regions. Most of the region's poor dwell in urban locations. The region's farm structures are highly diverse: large, commercial export-oriented farms dominate agriculture in the Southern Cone, particularly in Argentina and Brazil, but there are also some 15 million smallholder and family farms responsible for much of the region's food production.

Considerable economic uncertainty has impacted the region. Per capita incomes grew only at a rate of 0.1% in the last decade, with exchange rate volatility, particularly in Argentina. Incomes in the region are assumed to resume growth at 1.8% p.a. to an average of USD 12 000 per capita. The average share of food in household expenditures is estimated to be around 15% in 2017-19, implying considerable impacts of macro instability and food prices on welfare.[11]

Abundant in land and water, the region accounts for 13% of global production of agricultural and fish commodities and 25% of exports of such products, underscoring the importance to the region of trade openness at a global level. Export demand will therefore be the critical source of growth for the sector over the medium term.

Despite the importance of exports, the primary agriculture and fish sectors now play a modest role in the economy accounting for about 5% of Gross Domestic Product. As for other regions, this share is anticipated to decline further over the medium term.

Production

Agricultural and fish production in the Latin America and Caribbean region is projected to expand by 14% over the next ten years. Almost two thirds of this growth (65%) can be attributed to growth in crop production, about 28% is due to the livestock sector, and the remaining 7% originates from the expansion of fish output.

Intensive growth will be important to crop production expansion. Cropland use is projected to grow by 3% while crop area harvested will grow by 6%, due to an increase in multiple harvests per year. Total area harvested in the region will increase by 9 Mha, with nearly 54% and 19% coming from higher soybean from maize cultivation respectively. The region will remain the largest producer of soybeans with its global production share rising to over 54% by 2029. Average yields are expected to rise over the next ten years, and will account for most output growth in cereals, pulses, roots and tubers and sugarcane. Increased yields will account for 75% of the increase in production of maize, and over 50% for soybeans.

Livestock production growth will be based largely on intensive growth, with higher use of feed grains in production. Pasture area is expected to decline marginally by 2029, with the regions share of global pasture remaining at 17%. Bovine meat expansion will follow rising bovine numbers in Brazil and Argentina, as the herd expansion cycle is projected to remain strong. Low feed grain prices will support poultry and pork production, given feed-intensive production processes.

Fish production will recover from a contraction over the past ten years, with more than half of output growth attributable to the development of aquaculture in several countries across the region. Consumption of fish will also rise by 0.8 kg/capita, but at a slower pace than historical trends.

GHG emissions are projected to grow marginally by 4% p.a. over the next decade with an increase of 5% from animal sources. Emissions from crop sources are expected to remain unchanged by 2029.

Consumption

Per capita calorie intake is projected to rise to 3100 kcal/day, a rise of 78 kcal/day from the base period 2017-19, with over 60% of the increase coming from vegetal products, including cereals and vegetable oil. Calorie intake of sugar will decline following a longer-term decline in the region’s sugar consumption. But the region will remain the largest consumers of sugar in the world, with an intake of 39 kg/capita per year, well above the global average of 24 kg/capita per year. Initiatives across the region have sought to address the rising prevalence of overweight and obesity.

Per capita protein intake may rise to 87 g/day, an increase over the period of 2.8 g/day. Almost 60% of the increase will come from animal products, with the largest increase due to higher consumption of milk products. For its middle-income profile, the region is a large meat consumer at almost 60 kg/yr, which is almost double world levels. However, per capita meat consumption is projected to rise by only 2.4% over the next decade, as consumers increase their intake of protein from other sources.

Increasing intensification of the livestock sector is expected to lead to a 35% increase in feed use over the period. Most of that increase will come from maize, whose feed use will expand by almost 50%, but protein meal is also projected to expand by 35%.

A high share of sugarcane production will continue to be directed to ethanol production, consuming up to 58% of sugarcane production as the Renovabio program in Brazil is expected to sustain the country’s major role in ethanol markets. Ethanol production will expand by 8.3 bln L, accounting for 45% of global growth over the next ten years. A major uncertainty facing the sector will be how global energy markets evolve.

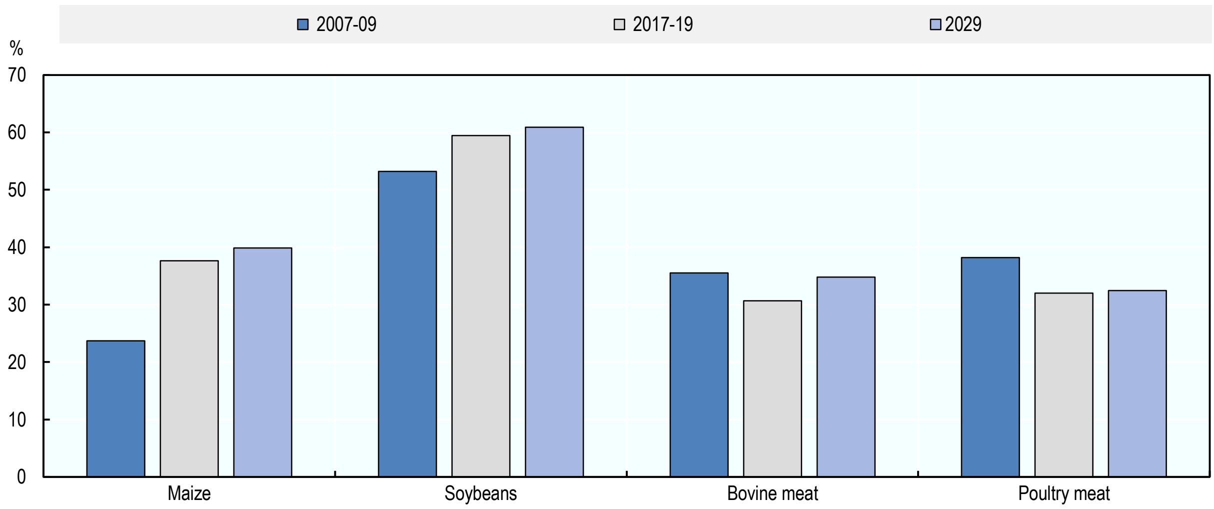
Trade

Trade is key to the success of the agriculture and fish sectors, with the share of output traded increasing each year – reaching over 28% by 2029 for these sectors. For the two main exporters, Argentina's share of output exported may rise to 52% and that of Brazil's to 34%. Paraguay's share of output exported will be higher at almost 70%. However, many countries in the region are net importers of the commodities covered in this *Outlook*, such as Mexico and Peru.[12] These data do not include fruit and vegetable trade, and countries such as Costa Rica and Ecuador export a large share of their fruit and vegetable production.

The region's expansion in supplies will allow it to remain an important global exporter of maize, soybean, beef, poultry and sugar. The market shares of the region for key commodities will rise over the medium term. By 2029, the region will account for 60% of global soybean and protein meal exports, 40% of global maize exports, 39% of sugar exports and 35% of bovine meat and poultry meat exports.

The status of global openness to trade will have important consequences for the sector. Trade agreements, and in particular trade relations between China and the United States, will play an important role in affecting the region's trade profile. A finalised EU-Mercusor Free Trade Agreement would support further growth in the agriculture and fish sectors of the region.

Figure 2.29. Trends in export shares of the Latin America and the Caribbean



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Figure 2.30. Change in area harvested and land use in Latin America and the Caribbean

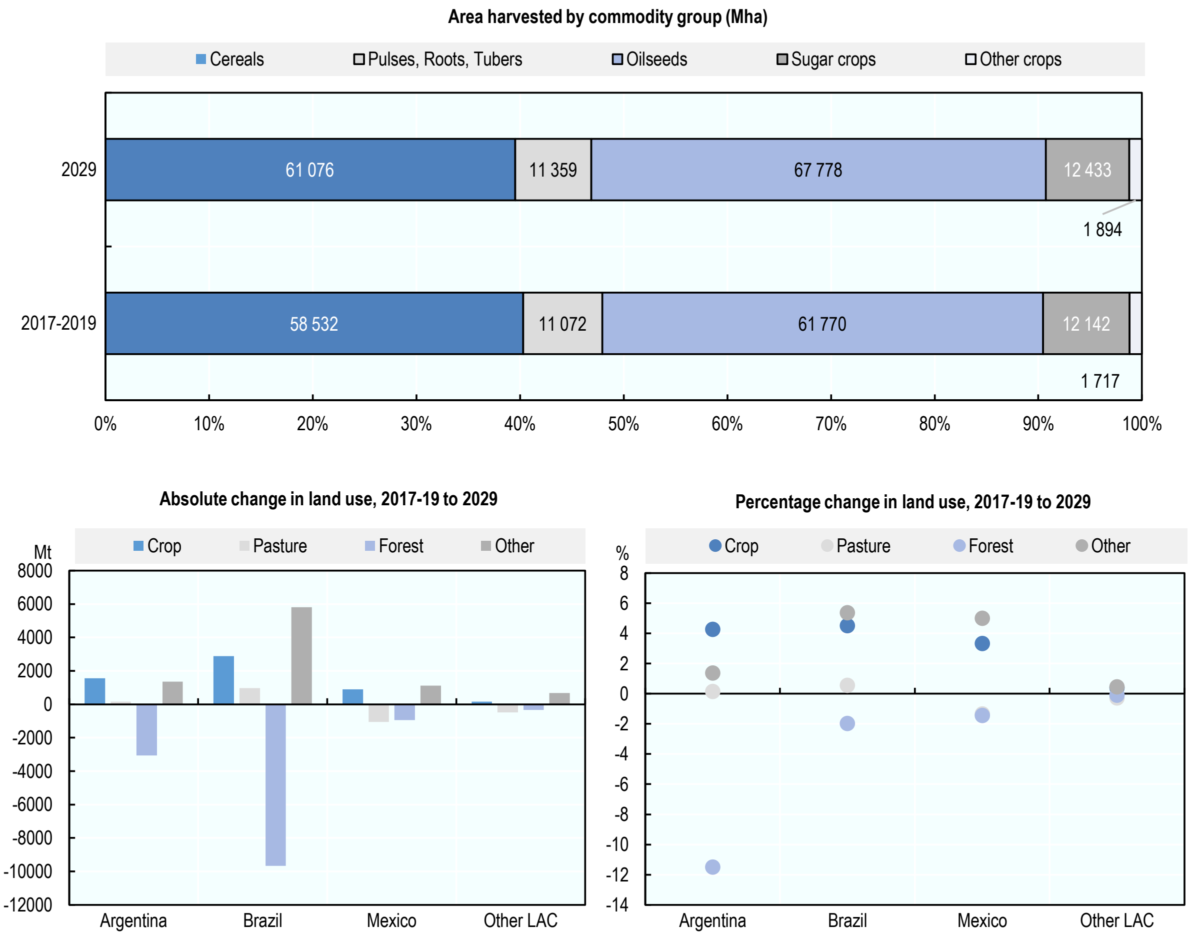
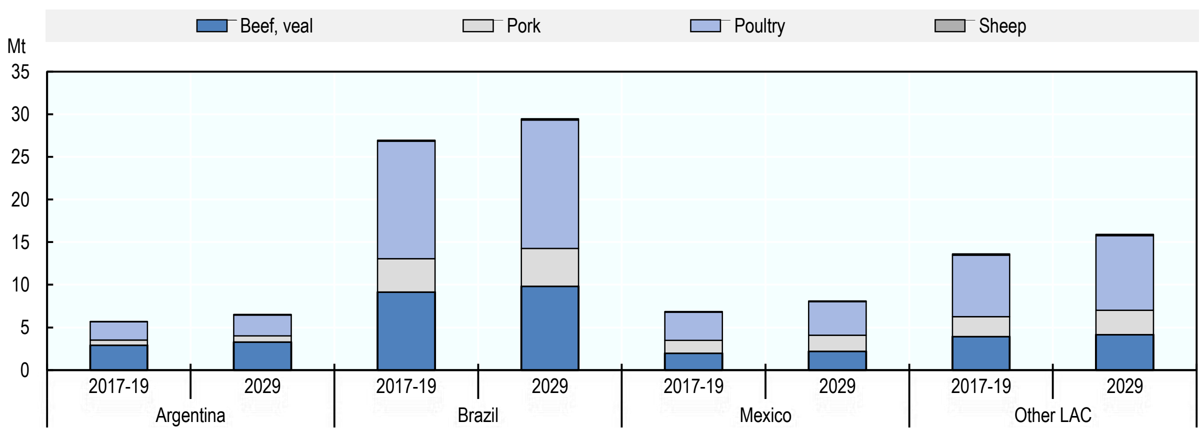
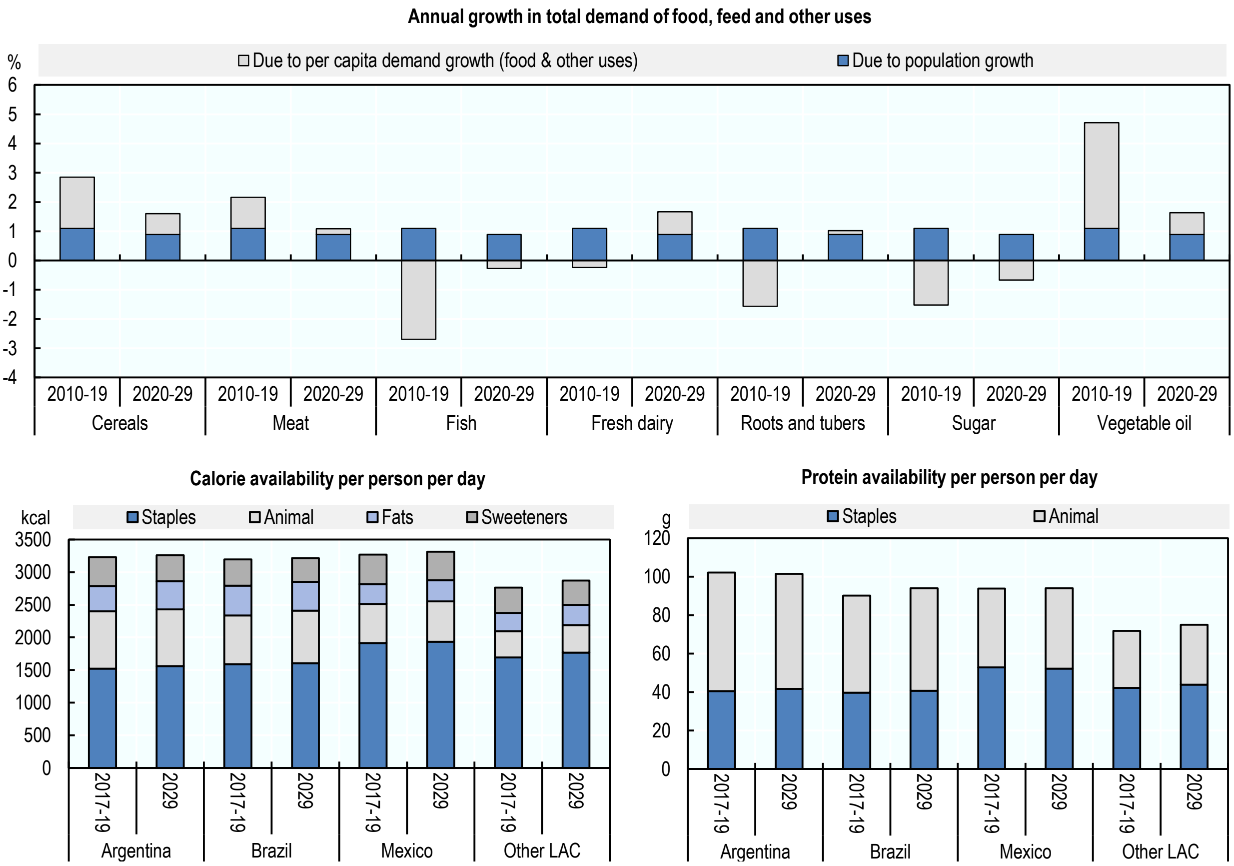


Figure 2.31. Livestock production in Latin America and the Caribbean



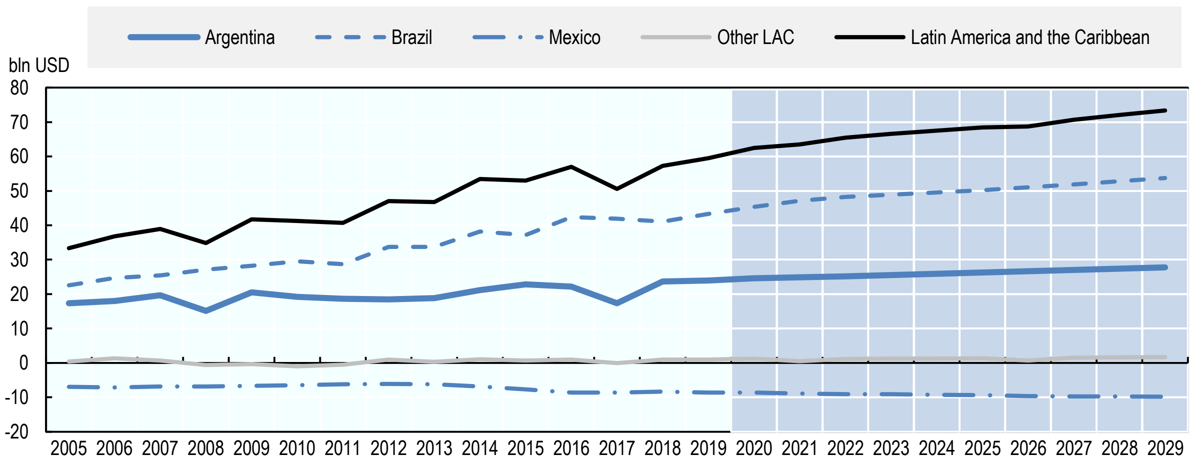
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 2.32. Demand for key commodities and food availability in Latin America and the Caribbean



Note: Upper panel - population growth is calculated by assuming per capita demand remains constant at the level of the year preceding the decade. Lower panel – Fats: butter and oils. Animal: egg, fish, meat and dairy except for butter. Staples: cereals, pulses and roots.

Figure 2.33. Agricultural trade balances in Latin America and the Caribbean



Note: Net trade (exports minus imports) of commodities covered in the *OECD-FAO Agricultural Outlook*, measured at constant 2004-06 USD.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142026

Table 2.6. Regional Indicators: Latin America and Caribbean Region

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Macro assumptions						
Population	577 518	643 959	703 584	9.26	1.06	0.78
Per capita GDP[1] (kUSD PPP)	9.59	10.25	12.15	18.50	0.09	1.81
Production (bln USD)						
Net value of agricultural and fisheries[3]	303.6	352.8	401.8	13.88	1.38	1.17
Net value of crop production[3]	95.8	131.7	157.4	19.53	3.17	1.44
Net value of other not incl. crop production[3]	74.7	80.5	88.7	10.16	-0.19	1.09
Net value of livestock production[3]	96.1	108.6	121.5	11.82	1.12	0.97
Net value of fish production[3]	37.0	32.0	34.2	7.01	-0.21	0.89
Quantity produced (kt)						
Cereals	171 881	253 450	308 351	21.66	3.57	1.62
Pulses	6 752	8 028	8 818	9.85	2.61	1.18
Roots and tubers	14 842	14 015	15 545	10.92	-0.51	1.00
Oilseeds[4]	123 817	189 096	230 364	21.82	4.35	1.47
Meat	44 022	53 135	59 999	12.92	1.54	1.01
Dairy[5]	7 156	7 959	9 582	20.39	0.10	1.76
Fish	17 952	15 529	16 623	7.05	-0.21	0.89
Sugar	53 213	51 207	61 329	19.77	-1.00	0.96
Vegetable oil	19 210	27 446	33 536	22.19	3.32	1.77
Biofuel production (Mn L)						
Biodiesel	1 937	8 686	10 586	21.88	6.53	1.84
Ethanol	27 513	37 163	44 767	20.46	4.21	1.29
Land use (kha)						
Total agricultural land use	694 485	706 480	711 534	0.72	0.15	0.06
Total land use for crop production[6]	159 766	167 231	172 708	3.27	0.40	0.25
Total pasture land use[7]	534 719	539 249	538 827	-0.08	0.07	0.00
GHG emissions (Mt CO2-eq)						
Total	885	922	962	4.32	0.29	0.30
Crop	109	129	130	0.15	0.64	0.27
Animal	775	792	832	5.00	0.23	0.30
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 918	3 035	3 096	2.01	0.34	0.22
Daily per capita protein availability[8](g)	84	85	85	0.84	-0.32	0.10
Per capita food availability (kg)						
Staples[9]	162.5	166.1	170.0	2.33	0.21	0.17
Meat	53.9	60.8	62.2	2.29	0.69	0.22
Dairy[5]	12.8	12.8	13.9	8.38	-0.71	0.96
Fish	9.6	10.6	11.4	6.97	1.33	0.63
Sugar	45.8	39.4	36.9	-6.40	-1.75	-0.52
Vegetable oil	17.7	19.2	20.2	5.22	0.57	0.48
Trade (bln USD)						
Net trade[3]	38.5	55.8	73.3	31.44	4.12	1.72
Net value of exports[3]	64.6	91.9	112.8	22.75	3.76	1.47
Net value of imports[3]	26.1	36.1	39.4	9.31	3.21	1.02

	Average			%	Growth [2]	
	2007-09	2017-19 (base)	2029	Base to 2029	2010-19	2020-29
Self-sufficiency ratio[10]						
Cereals	94.0	105.7	109.0	3.13	0.79	0.28
Meat	112.2	109.4	110.8	1.32	-0.14	0.01
Sugar	203.5	205.4	235.1	14.47	-0.19	0.60
Vegetable oil	146.5	132.0	137.1	3.88	0.54	0.30

Notes: 1. Per capita GDP expressed in thousands of real USD. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries output follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2004-06. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Notes

[1] Southeast Asia: Indonesia, Malaysia, Philippines, Thailand and Viet Nam. Other: Pakistan, Oceania and Other Developing Asia. Least Developed: Asia Least Developed. Developed: Australia, Japan, New Zealand, Korea. For mentioned regions, see Summary table for regional grouping of countries.

[2] Source is the 2011 database for the Global Trade Analysis Project (GTAP). Interpolation has been applied using expenditure data and GDP data for the region.

[3] For mentioned regions, see Summary table for regional grouping of countries.

[4] More detailed regional information may be found in *OECD-FAO Agricultural Outlook 2016-25*.

[5] Source OECD-FAO interpolated for 2017-19 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[6] Middle East: Saudi Arabia and Other Western Asia. Least Developed: North Africa Least Developed. North Africa: Other North Africa. For mentioned regions, see Summary table for regional grouping of countries.

[7] Source OECD-FAO interpolated for 2017-19 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[8] For mentioned regions, see Summary table for regional grouping of countries.

[9] These share data are extrapolated from Global Trade Analysis Project database, 2011, using food expenditure and GDP data from the *Outlook* database.

[10] Other LAC: Chile, Colombia, Paraguay, Peru and South and Central America and the Caribbean. For mentioned regions, see Summary table for regional grouping of countries.

[11] This estimate is made based on the GTAP (2011) database, using estimates for food expenditures and GDP.

[12] This analysis is based on USD constant 2004-06 international reference prices for commodities. The data include values for commodities covered in the *Outlook.*

3. Cereals

This chapter describes the market situation and highlights the medium-term projections for world cereal markets for the period 2020-29. Price, production, consumption and trade developments for maize, rice, wheat and other coarse grains are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world cereal markets during the coming ten years.

3.1. Market situation

Successive record harvests of major cereals in recent years have led to a significant build-up of inventories and much lower prices on international markets than were seen towards the end of the previous decade. Although world production of cereals increased again in 2019, stocks declined. This was due to a reduction in maize stocks – the result of gradual destocking of maize in the People's Republic of China (hereafter "China"). Wheat and barley output recovered in the European Union, the Russian Federation, and Ukraine after lower harvests than usual in 2018. Australia, however, witnessed a major crop failure after two years of already poor harvests. Global maize production increased in 2019 with higher crop harvests in Brazil and Argentina. For rice, adverse weather and weak producer margins translated into a slight reduction in global rice production from the 2018 all-time record. However, record stock levels from the previous season sustained an expansion of global supplies of rice in 2019. Higher production of wheat and coarse grains and ample cereal stocks generally meant that international prices for all cereals were weaker in 2019 compared to 2018.

Global trade of maize in 2019 remained around the average of the previous two years, with larger export from South America, while wheat exports expanded, especially from the European Union, Argentina, and the Ukraine. Global trade in rice fell to a three-year low in 2019, depressed by reduced Asian import demand, in particular from Bangladesh, China, and Indonesia. In view of high local stocks, growth of Chinese rice exports remained high in 2019. Global trade of other coarse grains recovered from its low in 2018, due primarily to stronger barley exports from the Ukraine.

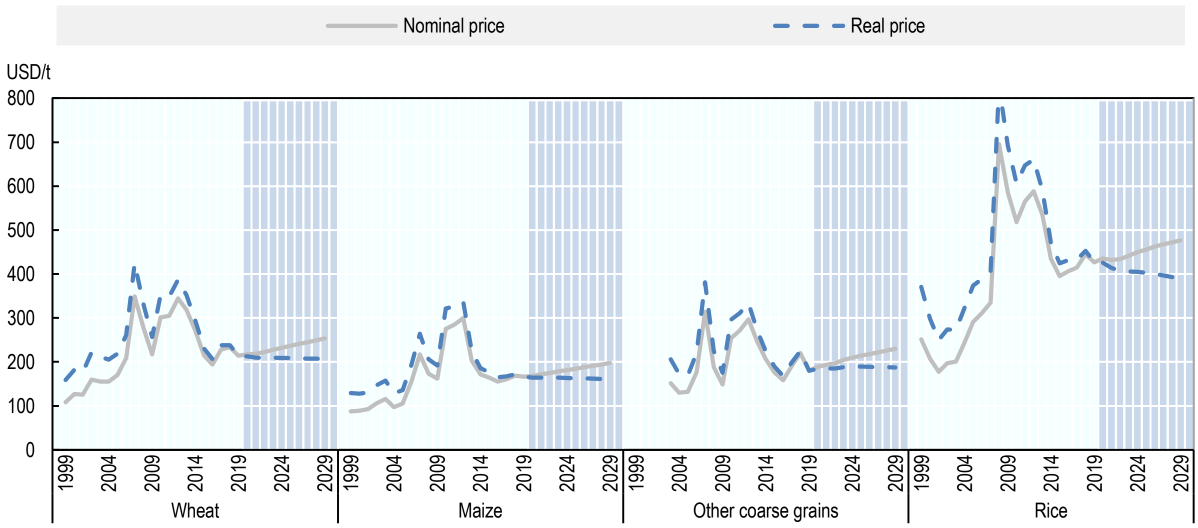
3.2. Projection highlights

In the last ten years, cereal production growth outpaced demand growth, leading to ample stocks and lower prices. Over the outlook period of 2020 to 2029 prices are projected to decrease further in real terms, while recovering slightly in nominal terms. Increased production and destocking will continue to exert downward pressure on cereal prices despite increasing demand. Lower anticipated prices, however, could weigh on planting decisions and reduce future supply.

Global cereal production is projected to expand by 375 Mt, to reach 3 054 Mt in 2029, mainly driven by higher yields. Maize production is projected to increase the most (+193 Mt), followed by wheat (+86 Mt), rice (+67 Mt), and other coarse grains (+29 Mt). Advances in biotechnology, resulting in improved seed varieties together with increasing use of inputs and better agricultural practices, will continue to drive increases in yields; however, these gains could be restrained by the impact of climate change and related production constraints like lack of investment or land tenure problems in developing countries. The global average cereal yield is projected to increase by 1.1% p.a. over the next ten years, markedly lower than the 1.9% registered in the previous decade, while total crop area is expected to increase only modestly. These changes are influenced by increasing profitability in the Black Sea region where production costs are lower compared to other major exporters.

Over the medium term, growth in overall cereal demand should be more subdued than in the previous decade as growth in feed demand is expected to continue to slow in China. The increase in the industrial use of cereals, notably of starch and biofuels, is likely to be more modest than in the previous decade. On the food demand side, per capita consumption of most cereals has reached saturation levels in many countries around the world. Overall food demand is nevertheless expected to continue to rise, driven by rapid population growth in Africa and Asia where cereals remain a major component of the diet. Wheat consumption is projected to increase by 86 Mt compared to the base period, largely destined for food. The use of maize is projected to increase by 172 Mt, largely driven by expanding livestock sectors in Asia and the Americas. Maize for human consumption is projected to increase by 23 Mt, especially in Sub-Saharan Africa where white maize is an important food staple and population growth remains high. Global consumption of rice is projected to increase by 69 Mt by 2029, with Asia and Africa accounting for most of the projected increase and direct human consumption remaining the main end-use of this commodity. The use of other coarse grains is projected to increase by 30 Mt, with higher food use expected in Africa.

Figure 3.1. 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: Thailand, 2nd grade milled 100%, fob Bangkok.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142045

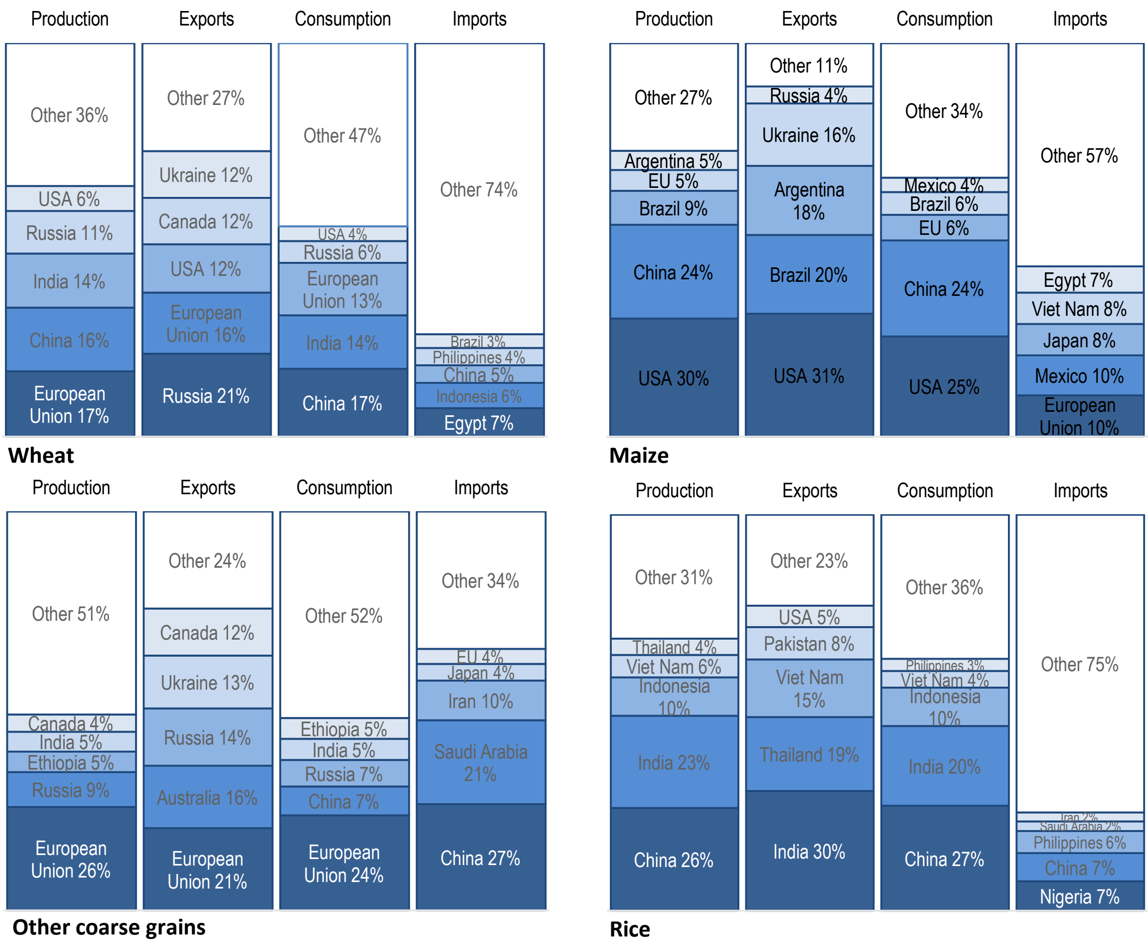
World trade in cereals is projected to increase by 96 Mt, to reach 517 Mt by 2029. The Russian Federation has become a major player in international wheat markets over the past few years, surpassing the European Union in 2016 to become the top exporter. It is expected to maintain its lead role throughout the projection period, accounting for 21% of global exports by 2029. Ukraine is expected to remain the fifth largest wheat exporter, continuously gaining shares in world trade and reaching 12% of global exports in 2029. For maize, the United States will remain the leading exporter although its market share will decrease as Brazil, Argentina, Ukraine, and the Russian Federation increase their shares of the global maize market. The European Union, Australia, and Belarus are expected to continue to be the main exporters of other coarse grains (mainly barley and sorghum), although growth in these exports will be restrained by increasing competition from maize in feed markets and consumer preferences in Africa that favour the domestic varieties of millets and sorghum. India, Thailand, Viet Nam, and Pakistan will remain the leading global suppliers of rice but Cambodia and Myanmar are expected to play an increasingly important role in global rice exports. Exports from China are expected to remain above the lows seen between 2010 and 2016.

In view of China's efforts to reduce its maize and, to a lesser extent, rice inventories, world cereal stocks are projected to contract over the outlook period. This will result in a decline in the global aggregate cereal stocks-to-use ratio from 32% during the base period to 26% in 2029. While in principle lower stocks should support a price recovery in principle, in practice global cereal stocks will remain at generally high levels over the outlook period, even increasing for wheat, other coarse grains, and rice. Chinese demand for feed, and its overall level of domestic supplies and associated changes in stocks are some of the main uncertainties over the projection period.

3.3. Global overview of cereal market projections

The global supply of cereal is dominated by a few major players. Figure 3.2 shows the projected shares of the top-five producers, consumers, and traders in world totals for 2029. Production, consumption and exports are concentrated in these countries or regions, while imports are generally more widespread, except for wheat. Exports are particularly concentrated for the four commodities, with the five top exporters accounting for between 72% and 89%. Over the years, however, the concentration of cereal markets has declined markedly, both for production and even more so for exports. Relative to other commodities, such as soybeans, the cereals market is less concentrated.

Figure 3.2. Global players in cereal markets in 2029



Notes: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

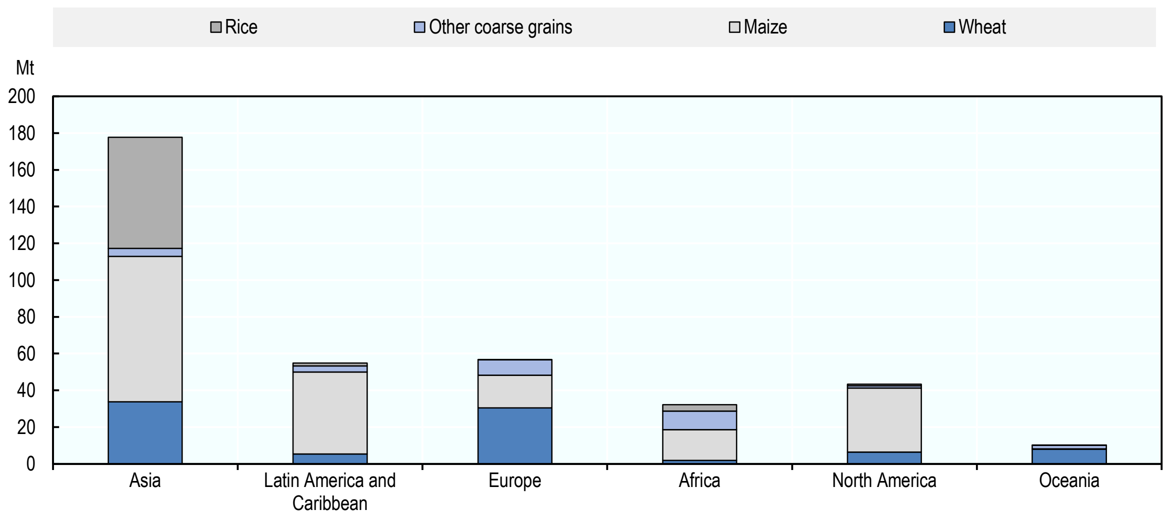
StatLink https://doi.org/10.1787/888934142064

Future cereal supplies will largely depend on the ability to increase yields. This in turn will depend on investments in improved cultivation practices, seed breeding, advances in biotechnology, structural changes towards larger farms, improved cultivation practices, and the ability to adapt technologies and enhance knowledge transfer across regions. Growth in harvested areas will play a minor role for cereals as the competitiveness of cereals relative to alternative crops does not improve. Total cropland expansions are expected to remain limited by constraints to converting forest or pasture into arable land or because of ongoing urbanisation. This *Outlook* assumes that despite the existing challenges arising from environmental restrictions and sustainability considerations, productivity growth for cereals will remain ahead of demand growth and lead to real declining prices.

Producers' support policies will continue to shape cereal markets. As this *Outlook* assumes no changes to existing policies, this will not change production incentives in the projections for most countries. The recent introduction in Mexico of a programme targeting small producers (less than 2.5 ha) in order to make them self-sufficient is worth mentioning. Farmers signing up for this programme receive a monthly income subsidy if they use their land for multi-cropping. As smallholder maize producers account for a considerable share of harvested maize areas in Mexico (20%), this programme could reduce the country's growth in import demand for maize with potential spill-over effects into other cereals markets.

Most of the increase in global cereal production is expected to occur in Asia, Latin America, Africa, and Eastern Europe, where national food self-sufficiency policies and investments in exporting countries will sustain production increases. In the past, such policies – which included input subsidies, support prices, direct payments, agricultural loans, insurance at preferential rates, access to improved seed varieties, and extension services – had an impact in increasing production. However, success was largely dependent on the timing and implementation of the policy itself.

Figure 3.3. Regional contribution of growth in cereal production, 2017-19 to 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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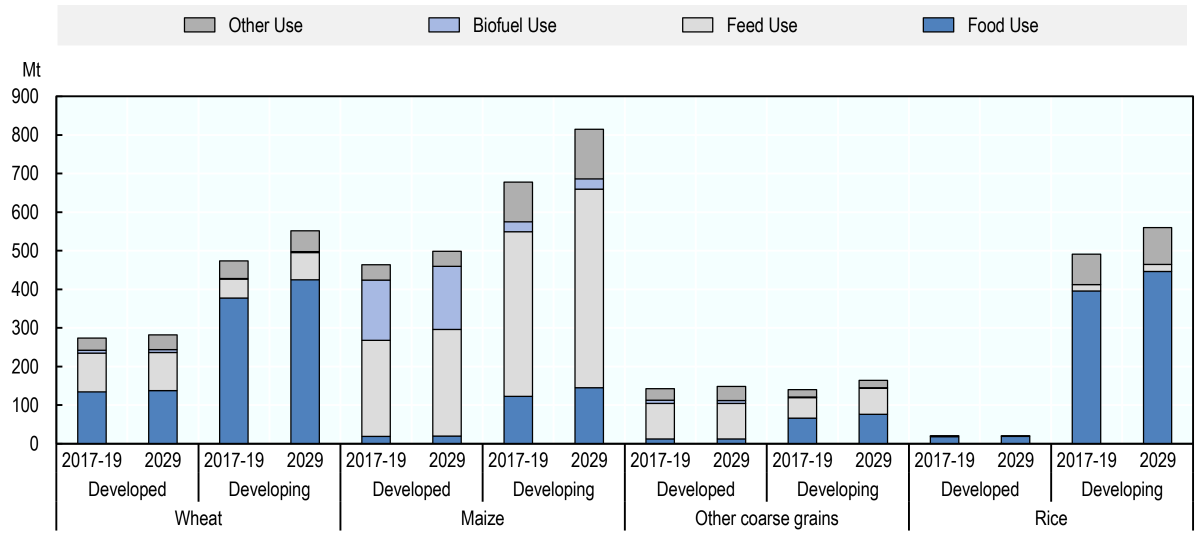
As the major use for maize and other coarse grains is feed and not much growth is expected from additional ethanol feedstock demand, the major demand driver in the coming decade will be the development of the livestock sector. This *Outlook* projects that global meat demand will continue to grow at a slightly slower pace than during the past decade. For wheat and rice, food use will drive demand in the coming decade. Since per capita demand of these cereals is stagnating at the global level, it is expected that increases of wheat and rice in the diets of lower income regions will continue to be offset by decreases in higher income regions, where these diet staples are losing importance. Therefore, the main driver for wheat and rice markets will remain population growth.

Figure 3.4. Cereal use in developed and developing countries



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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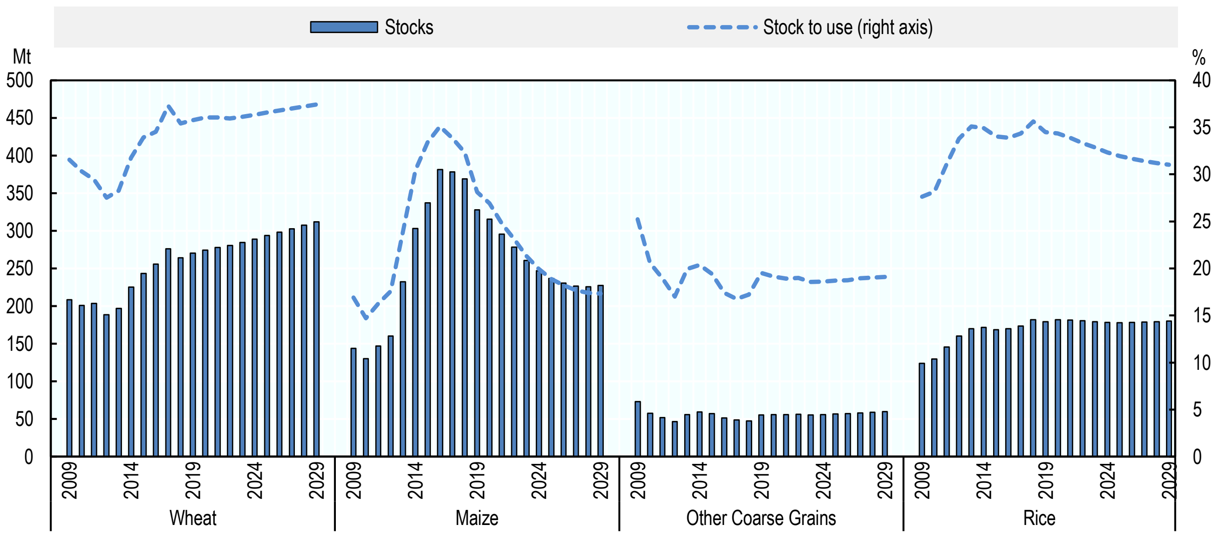
Figure 3.5. World cereal stocks and stocks-to-use ratios



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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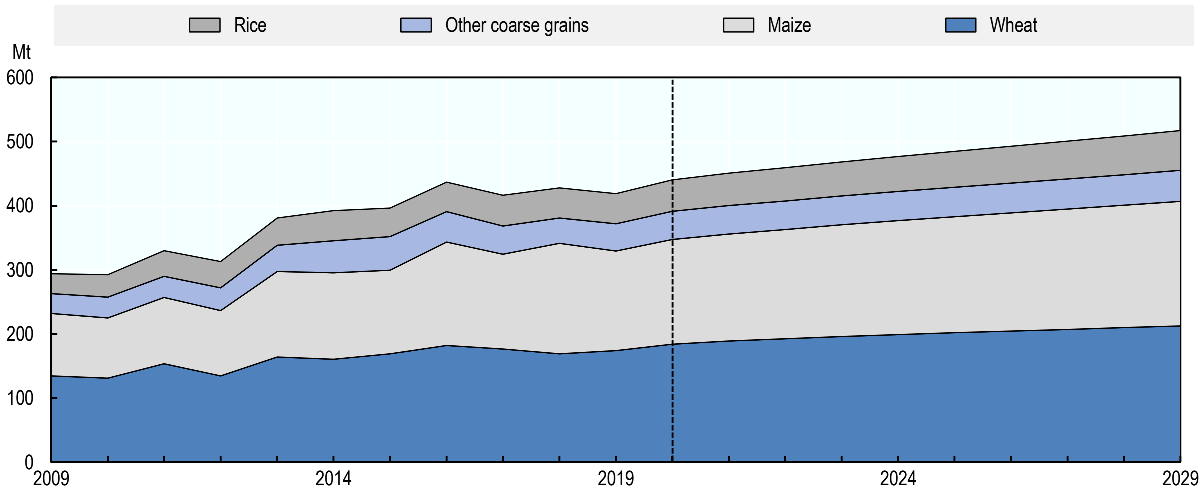
Global cereal stocks are expected to remain high over the outlook period, except for maize, where the global picture is dominated by the assumption that temporary stocks in China will be eliminated in the coming years (Box 3.2). As a consequence, the stock-to-use ratio for maize will fall from about 31% in the base period to about 17% in 2029 globally as China reaches levels of this ratio similar to those in other major countries. Stocks as a share of total consumption are expected to increase for wheat and rice, and remain similar to current levels for other coarse grains.

The measures that national governments implement to facilitate or to hinder trade can play an important role in the development of future cereal trade. For example, export taxes such as those implemented in Argentina will reduce the country's potential to expand cereal exports. On the other hand, import duties, which have recently become more popular, will reduce the demand of importing countries. However, the United States-China trade deal, in particular its commitments to expanding imports from the United States, may increase the future trade potential of cereals. During the past ten years the Tariff Rate Quota (TRQ) fill rates for maize and wheat in China where only about 40% and 75% for rice. This *Outlook* assumes that China will fill the TRQs of wheat and maize from 2021 onwards, adding 3 Mt to maize and 6.3 Mt to wheat traded globally and that its rice exports increase by about 1.4 Mt. However, since these quantities constitute only small shares of global exports, they will not be a game changer for the international cereal markets.

Figure 3.6. Global cereal trade volumes by commodity



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142140

3.4. Wheat

Wheat is the most important source of vegetable protein and food calories at the global level, and is part of many food products, such as bread, pasta, pastries, noodles, semolina, bulgur or couscous. It is also the food crop that covers the largest share of the global crop area (about 14%) and has the largest share in global food trade. However, since its yields are much lower than for maize, wheat is only the second most produced cereal after maize (752 Mt in the base period). Global production of wheat is dominated by the European Union, China, and India.

Global wheat production is projected to reach 839 Mt by 2029, growing at a more moderate pace compared to the last decade. Among the developed countries, increases in wheat production are expected to be highest in the European Union given its high yields, competitive prices, and grain quality. While developed countries are projected to increase production by 50 Mt by 2029, developing countries are projected to add 36 Mt to global output, equivalent to a marginal increase of their share of global production. India, the world's third largest wheat producer, is expected to increase its wheat production, largely sustained by its minimum support price policy that guarantees farmers a stable income. Production increases in the Russian Federation and Ukraine result from their domestically-produced hybrid seeds and fertilisers, low energy costs, large commercial farms, and soil quality.

Growth in global wheat consumption is mainly expected in the five largest wheat consuming regions – China, India, the European Union, the Russian Federation, and the United States – accounting together for 55% of global wheat use. Food use, which is expected to remain stable at about two-thirds of total consumption, is projected to represent 60% of the total increase in demand, while global per capita consumption will stagnate. As global livestock production slows and maize feed becomes more competitive, feed use of wheat is projected to increase more slowly than in the past decade. Global production of wheat-based ethanol is projected to increase by only 0.6 Mt, supported by efforts in China to boost ethanol production. In the European Union (a major user of wheat in ethanol processing in the past decade), biofuel policies are assumed to no longer support further growth of first generation biofuels. With global wheat production consistently higher than consumption throughout the projection period, the global stocks-to-use ratio is expected to reach 37% in 2029, up 3.5 percentage points from the base period.

The world wheat price, as measured by the benchmark US wheat No. 2 Hard Red Winter fob Gulf, should average USD 214/t in 2019, the first drop after two consecutive yearly increases. The world wheat price is projected to decline in real terms over the outlook period, but to slightly increase relative to the base period, reaching USD 258/t in 2029 (Figure 3.1). This decrease is a result of assumed low (and flat) real oil prices, average harvest expectations, and moderate growth in exports.

Global trade of wheat, the world's most traded cereal (Figure 3.6) is projected to expand from 2019 to 2029 by a similar amount as in the last decade. This increase in wheat trade reflects both changing yields and changing policies. Egypt, the world's largest wheat importer, recently signalled a preference for Black Sea wheat with reduced protein content supporting future export growth from that region. In the past decade, supply in the major wheat-producing countries of the Black Sea region – the Russian Federation, Kazakhstan, and Ukraine – has been volatile mainly due to yield fluctuations, thus rendering exports volatile as well. Nonetheless, production growth has been outpacing that of consumption on average due to the adoption of improved seed varieties.

Further increases in production are expected from these countries as a result, thus increasing their share of global wheat exports. The Russian Federation surpassed the European Union as the top exporter in 2016, driven by competitive prices and geographical proximity to major importing countries in the Middle East and North Africa. The Russian Federation is projected to remain the lead wheat exporter, accounting for about 20% of global wheat exports by 2029. The export share of the European Union is expected to increase slightly, given its competitive prices, grain quality, and proximity to major export markets in Africa and Asia. Wheat imports are expected to be spread more widely among many importing countries, with the top five – Egypt, Indonesia, Algeria, Brazil, and the Philippines – accounting for a combined share of 26% by 2029.

3.5. Maize

Maize is one of the oldest plants that humans have domesticated. It is also known as corn, the word used mainly in the United States, the world's largest producer, consumer and exporter. The success of maize is partly due to its high productivity and its exceptional geographic adaptability. Maize is generally categorised into one of two broad groups: yellow and white. Yellow maize accounts for the bulk of the total world maize market. It is grown in most northern hemisphere countries and is predominantly used for animal feed. White maize is produced for food in Latin America, southern Africa, and south Asia under a wide range of climate conditions. Market prices are usually higher for white than for yellow maize because consumers perceive it as a superior good.

Global maize production is projected to grow by 193 Mt to 1 315 Mt over the next decade, with the largest increases in China, the United States, Brazil, Argentina, and Ukraine. Maize production in China is projected to grow more slowly (2.1% p.a.) than over the previous decade (3.1% p.a.) as policy changes in 2016 eliminated maize price support and its associated stockpiling programme; these were replaced with direct farm subsidies and market-oriented purchasing. As a result, in the near term, planting areas in China will shift from maize to other commodities, such as soybeans and wheat, although may shift back to maize in a few years as stocks decline to more sustainable levels. In the United States, the maize planted area will remain stable and production increases will be due mainly to higher yields. Increased production in Brazil and Argentina will be sustained by slightly larger planted areas and productivity increases, motivated by favourable domestic policies (e.g. loans at preferential rates) and the depreciation of the respective currencies. Ukraine's production will be sustained by the cultivation of high yielding domestic varieties grown in rain-fed systems.

Global maize consumption is projected to increase at slower rates than in the past decade, in line with production. This is a result of a combination of factors including feed demand, biofuel policies, and human consumption. Feed use is projected to account for the largest share (68%) of the increase in maize consumption. During the outlook period, gains in feed-use efficiency and slower growth in livestock production have dampened feed demand. In addition, growth of maize for biofuel production is expected to be limited as current biofuel policies will not likely support further expansion in major producing countries. Maize for human consumption is projected to increase by 23 Mt, driven by both population growth and increasing global per capita consumption. Sub-Saharan Africa, where white maize is an important dietary staple and population is growing rapidly, is projected to have the strongest food consumption growth (+14 Mt).

The world maize price, as measured by the benchmark US maize No. 2 Yellow fob Gulf, is projected to average USD 167/t in 2019, thus unchanged from 2018. Declining global maize stocks, assumed higher energy and input prices, and expected slower growth in export demand compared to the previous decade will limit real gains in the international maize price. Accordingly, while the nominal price is projected to increase to USD 201/t by 2029, this increase will lag behind inflation and, as a result, the real price will decrease (Figure 3.1).

Trade in maize is projected to expand by 36 Mt to 194 Mt by 2029. The export share of the top five exporters – the United States, Brazil, Ukraine, Argentina, and the Russian Federation – is projected to account for about 89% in 2029. Although the United States is projected to remain the top maize exporter, its export share will decline (from 34% to 31%) as traders in Southeast Asia signal their preference for South American corn due to perceptions over moisture levels and kernel hardness. As a region, Latin America is projected to increase its export market share from 38% in the base period to 40% in 2029 owing to production gains supported by favourable domestic policies (e.g. loans at preferential rates) and the depreciation of local currencies. It is also expected that the Ukraine and the Russian Federation will be rising maize exporters given that their domestic supplies are expected to increase faster than domestic consumption, with the surpluses entering the global market.

The top five destinations for maize will continue to be Mexico, the European Union, Japan, Egypt, and Viet Nam. Viet Nam, which has experienced a steady increase in maize imports since 2012, is expected to replace Korea to become the fourth largest maize importer, driven by its expanding livestock and poultry sectors. Malaysia is expected to further increase its imports as its livestock sectors continues to grow.

3.6. Rice

Rice is widely cultivated around the world, mainly as an annual crop even though it may survive as a perennial. It is grown predominantly under flooded conditions as this facilitates fertilisation and reduces the incidence of weeds and pests. Most of the global rice production is located in Asia, with many countries in the region growing more than one crop per season. More than half of global rice production is concentrated in China and India. The path of production systems in developing Asian countries largely influences global markets, i.e. increasing yields in Asian countries, significantly impacts increases in global availability and trade.

Global rice production is projected to reach 582 Mt in 2029. Asia is projected to contribute the majority of additional global production, accounting for 61 Mt of the increase during the outlook period. The highest growth is expected in India, the world's second largest rice producer. Production gains here are expected to be sustained through yield improvements supported by policy measures that promote the use of new seed varieties and the expansion and maintenance of irrigation facilities. The maintenance of the minimum support price over the outlook period should support plantings in India that are similar to those in China. In China, however, production is projected to grow at a slower pace than the previous decade amid expectations that efforts to move the least productive lands out of cultivation will continue as part of a broader effort to improve the quality of rice production. Production gains in Thailand and Viet Nam will mainly depend on yield improvements, given the price expectations over the outlook period and assuming governmental efforts to promote a shift towards alternative crops are effective.

In addition to infrastructure and input-related impacts, future production of rice will largely depend on the varietal structure of plantings and the adoption of improved seed strains. In developed markets, production is expected to fall in Korea and Japan below the base period's level, but to increase in the United States and European Union, although not to exceed the 2010 peak for the United States nor the 2009 peak for European Union. Least Developed Asia – comprised of Myanmar, Cambodia, the Lao People's Democratic Republic, and Bangladesh – is expected to continue to increase its productivity levels as higher-yield varieties and implement better agricultural practices are adopted. While rice production is expected to increase in many African countries, this *Outlook* assumes that African rice production will be constrained by rain-fed water systems, limited use of inputs, and inadequate farm infrastructure.

The world price for rice (Thailand grade B milled 100%, fob Bangkok) decreased to USD 426/t in 2019. Over the outlook period, rice import demand in Sub-Saharan Africa (where the population is increasing rapidly) is expected to be strong. However, large policy-driven production gains in major importing countries in Asia are expected to limit global growth of rice imports to less than half the rate seen in the previous decade. Consequently, the increase of the nominal price, which is projected to reach USD 476/t by 2029, will lag behind inflation and the real price will decrease (Figure 3.1).

Box 3.1. Global Indica and Japonica rice markets

There are many varieties of rice produced and consumed which all can be put into two major categories of rice traded on the global market: Indica and Japonica rice.[1] The differences in the Indica and Japonica rice market structures appear to be based on the differences in their characteristics, production zones, consumer preferences, and government policies. The frequent divergence in their price movements is due to differences in these characteristics and strong consumer preference for one rice over the other. The Japonica rice market is assumed to be composed exclusively of temperate Japonica rice, and the Indica rice market of all the other varieties (including tropical Japonica rice). Global Japonica rice production was estimated at 71.3 Mt in 2017 and increased by an average of 3.0% p.a. over 2003–2017 (Table 3.1).

China accounted for 72% of the global Japonica rice production in 2017. World Japonica rice exports and imports were estimated at 2.3 Mt in 2017, accounting for an estimated 14.6% of global rice production, 14.4% of global rice consumption, and 4.8% of global rice trade. The global Indica rice production was estimated at 417.3 Mt in 2017, almost six times that of Japonica, and it increased by 1.4% p.a. between 2003 and 2017. World trade in Indica rice stood at 45.9 Mt in 2017, with India and China accounting for 49% of the global Indica production. Indica rice trade increased by about 5% p.a. during the 2003-2017 period, much higher than that of Japonica rice. The projections for the coming decade envisage stronger growth of Indica rice than of Japonica rice production, and trade growth will be greater for Indica rice, thus further reducing the share of Japonica on international markets.

Table 3.1. Global Japonica and Indica rice markets

(1 000 t)	2003	2017	Annual growth rate (2003-2017)	(1 000 t)	2003	2017	Annual growth rate (2003-2017)
Japonica rice production				**Japonica rice exports**			
World	47 329	71 255	3.0%	World	2 067	2 329	0.9%
China	29 690	51 116	4.0%	China	72	765	18.3%
Japan	7 091	7 586	0.5%	United States	506	674	2.1%
Egypt	3 900	4 300	0.7%	EU28	no data	263	-
Korea	4 451	3 972	-0.8%	Korea	211	63	-8.3%
EU28	no data	1 497	-				
Japonica rice consumption				**Japonica rice imports**			
World	53 661	69 286	1.8%	World	2 067	2 329	0.9%
China	34 626	47 267	2.2%	Japan	547	494	-0.7%
Japan	8 148	8 259	0.1%	Korea	193	290	2.9%
Korea	4 512	4 755	0.4%	EU28	no data	156	-
Egypt	3 225	4 351	2.2%	United States	5	19	10.1%
EU28	no data	1 473	-				
Indica rice production				**Indica rice exports**			
World	345 168	417 349	1.4%	World	25 397	45 994	4.3%
India	88 522	110 000	1.6%	India	3 100	12 800	10.7%
China	82 772	94 873	1.0%	Thailand	10 137	10 500	0.3%
Indonesia	35 024	37 000	0.4%	Viet Nam	4 295	7 000	3.6%
Bangladesh	26 152	32 650	1.6%	Pakistan	1 868	4 300	6.1%
Viet Nam	22 082	28 943	2.0%	Myanmar	130	3 300	26.0%
Thailand	18 011	20 370	0.9%	United States	2 804	2 184	-1.8%
Indica rice consumption				**Indica rice imports**			
World	357 714	412 077	1.0%	World	22 946	45 846	5.1%
India	85 622	97 350	0.9%	China	1 121	5 499	12.0%
China	97 474	95 433	-0.2%	Bangladesh	850	3 200	9.9%
Indonesia	36 000	38 000	0.4%	Nigeria	1 448	2 600	4.3%
Bangladesh	26 700	35 200	2.0%	Indonesia	650	2000	8.4%
Viet Nam	18 230	22 100	1.4%	EU28	No data	1 744	-
Philippines	10 250	13 100	1.8%	Cote d'Ivoire	743	1 500	5.1%

1. This separation does not focus on genetic strictness of rice types, but explores the conventional major rice types, Indica and Japonica rice, based on practical rice market separation

Sources: Koizumi and Furuhashi (2020) Global Rice Market Projections distinguishing Japonica and Indica rice under climate change, JARQ, Vo.54.1, pp.63-91. https://www.jstage.jst.go.jp/article/jarq/54/1/54_63/_article/-char/en.

Direct human consumption continues to be the main end-use of rice. A major driver for global rice consumption is growing demand from developing countries in Asia and African countries. World rice consumption is projected to increase by 69 Mt by 2029. It is expected to continue to be a major food staple in Asia, Africa, Latin America and the Caribbean. The expected additional consumption is almost entirely attributable to increasing food demand in developing countries (Figure 3.4). In some Asian countries, where most of the production is consumed domestically, demand is expected to decrease. In India, however, an additional 4 kg to the annual per capita consumption is projected over the next ten years, partly driven by the government's social policy to improve food security of vulnerable households through the public distribution of food grains. In Africa, where rice is gaining in importance as a major food staple, per capita rice consumption is projected to grow by about 4 kg over the outlook period. With rice utilisation projected to grow at a slightly faster pace than world supply, the global stocks-to-use ratio is projected decrease marginally, from 35% in the base period to 31% by 2029.

Table 3.2. Rice per capita consumption

kg/capita	2017-19	2029	Growth rate (% p.a.)
Africa	26.9	30.8	1.16
Asia and Pacific	77.6	78.1	-0.05
North America	13.1	13.1	-0.39
Latin America and Caribbean	28.2	28.3	-0.20
Europe	6.4	6.7	0.37

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Rice is a thinly traded commodity compared to other cereals (Figure 3.6). Global growth in trade is projected to be 2.8% p.a. over the outlook period, with the volume exchanged increasing by 15 Mt to 62 Mt in 2029. India is expected to remain the world's largest rice exporter, with demand from its traditional African and Near Eastern markets expected to drive export gains. Thailand, where shipments have traditionally been largely composed of higher quality rice, is expected to remain the second largest rice exporter. In Viet Nam, expected growth is partly linked to ongoing efforts to diversify the varietal make-up of the country's rice shipments, which could underpin an increase in deliveries to the Middle East, Africa, and East Asia. As a group, however, the top five rice exporters – India, Thailand, Viet Nam, Pakistan, and the United States – are expected to see their export shares reduced slightly compared to the past decade. This reflects expectations of Chinese shipments remaining well over the lows seen between 2010-2016, albeit at a somewhat lower level than recorded in 2019. Moreover, amid expectations of large exportable surpluses, shipments by Cambodia and Myanmar are expected to continue making headway, passing from a total base period level of about 4 Mt to 7 Mt by 2029. The largest import growth is projected to take place in African countries where demand – driven by income growth, urbanisation, and rapid population growth – is expected to continue to outpace production. This would increase Africa's share of world rice imports from 37% to 51%, thus becoming the prime destination of global rice flows.

3.7. Other coarse grains

Other coarse grains comprise a heterogeneous group of cereals, including barley, oats, rye, sorghum and millets. Production is constrained in regions that rely on rain-fed systems. There has been limited progress on improved seeds in Africa and Asia, thus constraining sorghum and millets food availability in these regions. Production can more easily expand in regions that are naturally endowed for cultivating these crops and through improved technology, specifically in Europe and the Americas. Although other coarse grains production costs are higher than for wheat and maize, production is expected to remain attractive in regions where weather and technology facilitate the production of multiple crops, in which rotation patterns help maximise the returns per hectare.

This *Outlook* projects that growth in global production of other coarse grains will reach 319 Mt by 2029. With global planting area expected to decrease, production growth will be sustained by yield gains; these are projected to increase by about 0.9% p.a. Africa is projected to account for almost one-third of global growth (+10 Mt), with yields increasing at 1.7% p.a. The absolute yields remain low compared to other regions, mainly because Africa produces its own indigenous varieties of millet and sorghum. In Europe, the largest production gains will originate from the European Union Member countries, Ukraine, and the Russian Federation. Overall, the planted area in Europe is expected to decline, reflecting the lower profitability of barley against other crops such as maize and wheat. Production gains are sustained by yield gains; Ukraine is projected to increase yields by 1.5% p.a., assuming increasing crops rotation in combination with better agricultural practices and abandonment of non-productive land. In Asia, the largest expansion of production is projected to occur in China. Production in India is expected to contract due to decreased harvested area without compensating yield gains. Although millets were included in the country's National Food Security Act in 2013 for distribution through the public procurement system, the support effect has been limited in part because small farmers were not included, as well as to poor soils and limited water availability.

Total demand for other coarse grains is projected to increase by 30 Mt by 2029, with feed demand accounting for nearly half of that increase (+14 Mt), followed by food (+10 Mt) and industrial use (+6 Mt). Feed demand is expected to remain relevant in Europe, although contracting, as barley is a reliable source of protein and energy in feeding livestock. Specifically, for dairy production, barley is expected to remain an important feed ingredient. Globally, the expected intensification in the dairy and meat production systems favours the use of industrial feed for which maize and soybeans are the prominent ingredients, thus slowing feed demand growth for other coarse grains. China is expected to increase feed demand, driven by the meat sector, similar to North Africa, Iran, Turkey and Saudi Arabia. In the latter three countries, albeit the intensification of their production systems, barley is expected to remain as a high-quality feed, in particular for ruminants such as camels, sheep and goats. Global food demand of other coarse grains is expected to increase only in Africa, although decreasing on a per capita basis as already observed during the past decade.

The world price for other coarse grains, as measured by the price for feed barley (France, fob Rouen) recovered to USD 186/t in 2019. Over the previous decade, the major driver that sustained other coarse grain prices was feed demand, particularly from China due to higher domestic maize prices. Over the outlook period, maize prices are expected to be competitive, therefore reducing the demand for substitutes such as barley and sorghum. Nominal prices could recover over the projection period, reaching USD 234/t by 2029.

Global exports of other coarse grains are projected to reach about 48 Mt in 2029. Ukraine would account for most of the additional exports, followed by the Russian Federation, Australia, the European Union, Kazakhstan, and Argentina, However, the European Union is expected to remain the largest exporter, followed by Australia, the Russian Federation, Ukraine, and Canada. By 2029, although China is projected to remain the most important destination for other coarse grains, reaching 11.4 Mt in 2029, import expansion will be modest. This *Outlook* assumes that the current phytosanitary protocols that China has with major exporters will remain in place, thus facilitating trade. Other major importers are Middle Eastern countries, where in general weather conditions and water availability allow for only one crop per calendar year. These countries therefore focus their resources on producing food cereals (wheat) rather than feed crops, which is the ultimate use of sorghum and barley in the Middle East. Sub-Saharan Africa is expected to become a net importer by 2029, although imports will be constrained by consumer preferences and market structure. Other coarse grains will be mainly consumed and produced by self-sufficient farmers, such that consumption of imported millet or sorghum will be limited to urban areas.

3.8. Main issues and uncertainties

The COVID-19 pandemic in 2020 will not change the general situation of ample cereal supply and good harvest prospects in the near-future marketing seasons. Short-term risks due to this pandemic are mainly related to distributional aspects and supply problems in some countries which rely on seasonal workers. While cereal production in developed countries is highly mechanised, in some developing countries production depends on seasonal workers that might not be available due to restrictions to labour movement. This is particularly the case for cereal production in Africa, India and some South East Asian countries. The extent of the impact will depend on the measures adopted by each country to control the disease. The pandemic could have two types of impacts on cereal demand and each has different implications for prices. The current slowdown in economic growth could weaken cereal demand further which could lead to downward pressure on cereal prices in the short term.. However, as long as the movement of people is restricted, this might also lead to less consumption outside the home and raise the demand for staple food (not only related to panic buying of pasta and flour), thereby potentially supporting prices.

Nonetheless, securing domestic food supply is among the major concerns of countries in this crisis. Trade-hindering policies, such as export restrictions to secure domestic supply, are often discussed in this context. However, such policies would place availability in import-dependant countries at risk and disrupt international markets and global cereal trade.

Over the medium term, once supply chain disruptions are resolved, the impact of the COVID-19 pandemic on cereal markets should be limited unless national policies move towards sustained higher self-sufficiency goals or to a sustained increase in the levels of stock holding. Similarly, if the development of the global economy cannot resume the path it has been on in recent years, demand for cereals ten years ahead could be lower than projected in this *Outlook*.

While normal assumptions for weather lead to positive production prospects for the main grain-producing regions, plant diseases, pests and adverse weather events accentuated by climate change may cause higher volatility in crop yields, thereby affecting global supplies and prices. Historically, deviations of crop yields from trends have been more pronounced in Australia, Kazakhstan, the Russian Federation, and Ukraine. Crop yields in South American countries, such as Argentina, Brazil, Paraguay and Uruguay, also show high variability. Over the last few years, the increasing participation of the Black Sea region in global cereal markets has decreased some of the risks associated with crop shortages in traditional major exporting countries. However, given the higher yield variability in that region, global supplies to world markets are becoming more volatile, which may lead to more pronounced swings in world market prices. In addition, the impact of pests, such as the fall army worm, in large producing and exporting countries could be severe for world markets. Finally, production in many African countries relies on rain-fed systems and thus have a low resilience to extreme weather events.

China’s feed demand, and its overall level of domestic supplies and associated changes in stocks remain a major uncertainty in global cereal markets. In 2018, based on its third National Agricultural Census, Chinese authorities revised their crop production estimates, reporting significant changes for maize (+266.0 Mt) in the last ten years. Feed and stock figures, however, were not provided and are thus only estimates. Nonetheless, even with this revision, maize production in China has been decreasing over the last three years owing to the 2016 policy change, which replaced the market price support system with a direct maize subsidy programme. It is assumed this policy change will continue to result in the further release of China’s accumulated stocks over the projection period. However, if the actual level of stocks are considerably below current estimates, there is a possibility that China could become a major maize importer sooner than expected if the country changes its import policies. This could greatly influence future developments in the global cereal markets. Box 3.2 provides an assessment of this uncertainty.

Cereal prices could be affected by a potential further slowdown in economic growth of major importers and exporters, and lower energy prices. Moreover, the reinforcement of food security and the sustainability criteria in the reform and design of biofuel policies (in the European Union, Brazil, and the United States) may also impact the demand for cereals.

In addition to the uncertainties associated with policy responses to COVID-19 which could have short term impacts, changes in the international trade environment for cereals due to trade frictions and evolving regional agreements may also influence trade flows. Further trade protection, the resolution of existing trade tensions or disputes (e.g. the dispute between China and Australia concerning barley), and the emergence of new regional trade agreements may shift trade patterns in cereal markets.

The impact of Brexit on cereal markets should not be severe as trade flows in general can be redirected relatively easily. The United Kingdom is, however, the world's largest producer of oats, although most of its production is consumed by its domestic market. However, processed oat products, such as porridge, are exported to other European countries and depending on the final trade deal, this could influence the future of oats markets in the United Kingdom.

Box 3.2. China's grain reserves, price support and import policies: Examining the medium-term market impacts of alternative policy scenarios

China removed its support prices for maize in 2016 and began destocking its large public reserves of maize. A recent OECD study (Deuss and Adenauer, 2020) investigates what would happen if China were to also eliminate its support prices for rice and wheat and reduce public stocks of these two commodities. The analysis examines domestic and international market impacts over the next ten years by comparing a baseline (or business-as-usual scenario) with three scenarios that each assume support prices are eliminated, but incorporate different assumptions about China's import policies.

The probability that China might eliminate its support prices and revise its import policies has increased in recent years due to multiple factors. First, China has abolished support prices for several other commodities. Second, it has introduced pilot programmes where support prices for wheat and rice were replaced by more market-oriented mechanisms. In addition, China is facing international pressure to remove support prices. In February 2019, the WTO dispute panel determined that China had exceeded its allowed level of support for rice and wheat. Furthermore, it is also becoming more probable that China might increase its grain imports by revising the way it administers its grain tariff rate quotas (TRQs). Since their introduction in 2001, China's TRQs for maize, rice and wheat have been consistently under-filled. In April 2019, the WTO dispute panel determined that China administered its TRQs in a manner inconsistent with its Accession Protocol obligations.

The scenario results show that a drastic change in China's support price and public stockholding policy is expected to affect domestic and international markets significantly, especially during the transition period (2019-2021) when temporary public stocks are depleted. The actual level of public stocks plays an important role during this period as larger volumes of reserves imply that more reserves would be released and hence the effects amplified. Removing support prices for rice and wheat is projected to lead to big drops in domestic prices during the transition period. Over the medium term, domestic prices under the scenarios are expected to recover as stock levels stabilise and the market adapts to an environment without support prices.

For China's policy makers, this analysis has two important implications. First, to avoid severe negative impacts on farm income due to the lower domestic prices, policy makers could provide support to farmers, which should be limited in time since the market impacts dissipate over the medium term. Second, policy makers should consider carefully how long the destocking period should last, keeping in mind the costs and benefits of extending the destocking period. Extending the destocking period could lead to lower fiscal revenues from the sales of the stored commodities as the quality of the commodities deteriorates the longer they are stored. A longer destocking period also implies a longer period of compensatory payments to farmers and of managing the temporary reserves. In contrast, a slower destocking process would give farmers more time to adjust gradually to the new market environment and could spread and potentially weaken the severity of the price and production impacts.

Crucial in the policy maker's decision process on the amount of temporary support and period of destocking is the knowledge about the size and quality of the stored commodities. For producers and consumers in both domestic and international markets, transparency in the reporting of stock levels and stockholding policies is necessary to help them deal with the significant impacts they could face during the initial years a new policy is implemented.

Source: Deuss, A. and M. Adenauer (2020), "China's grain reserves, price support and import policies: Examining the medium-term market impacts of alternative policy scenarios", *OECD Food, Agriculture and Fisheries Papers*, No. 138, OECD Publishing, Paris, https://doi.org/10.1787/f813ed01-en.

4. Oilseeds and oilseed products

This chapter describes the market situation and highlights the medium-term projections for world oilseed markets for the period 2020-29. Price, production, consumption and trade developments for soybean, other oilseeds, protein meal, and vegetable oil are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world oilseed markets during the coming ten years.

4.1. Market situation

Prices of oilseeds and products in 2019 were at their lowest in several years, a reflection of the slowdown in global demand for oils and protein meals, as well as the uncertainties stemming from bilateral trade disputes. Since trade relations between the United States and People's Republic of China (hereafter "China") improved towards the end of 2019, trade policies have had less short-term influence on world prices, especially for soybeans.

Global soybean production declined in 2019/20 due to the considerable decrease in plantings in the United States. In contrast, the soybean harvest in South America set a new record exceeding 190 Mt. Despite the decline in global soybean production, soybean prices did not increase, because of an even more pronounced contraction in soybean consumption. Notwithstanding expectations of a partial recovery in China's pig herd, African Swine Fever continues to weigh on the country's livestock sector, curbing feed demand, especially of soybean meal which is the dominant protein meal. World production of other oilseeds (rapeseed, sunflower and groundnut) declined slightly in 2019/20. Canada and the European Union reported a considerable shortfall of rapeseed production that was not offset by increases in other major producing countries.

The vegetable oil sector was characterised in January and February 2020 by a slowdown in demand growth in China and India caused by the decreases in out-of-home consumption. In China, this was due to the COVID-19 pandemic and in India to high domestic prices. Several countries also expanded their crushing capacity, thus increasing their seed imports at the expense of oil and meal purchases. Accordingly, exports by the main suppliers of vegetable oil, such as Indonesia and Malaysia, expanded less than average, leading to lower prices. In response to these factors, Indonesia introduced higher biodiesel mandates that led to an increase in domestic demand for palm oil. The slight decline in palm oil production of Malaysia balanced the domestic market there.

4.2. Projection highlights

During the outlook period, global soybean production is projected to continue to expand at 1.3% p.a., with the expansion of area harvested accounting for about a third of global output growth. With domestic output projected to reach 140 Mt by 2029, Brazil is expected to be the world's largest producer, ahead of the United States with a projected production of 120 Mt by 2029. Together, these countries are expected to account for about two-thirds of world soybean production.

Production of other oilseeds is projected to increase by 1.2% p.a. over the next decade, implying slower growth relative to the last ten years. This is due in part to curbed demand for rapeseed oil as a feedstock in European biodiesel production. Crushing of soybeans and other oilseeds into meal (cake) and oil will continue to dominate demand and increase faster than other uses, such as direct food/feed consumption of soybeans, groundnuts and sunflower seeds. Overall, 91% of world soybean output and 87% of world production of other oilseeds are projected to be crushed by 2029.

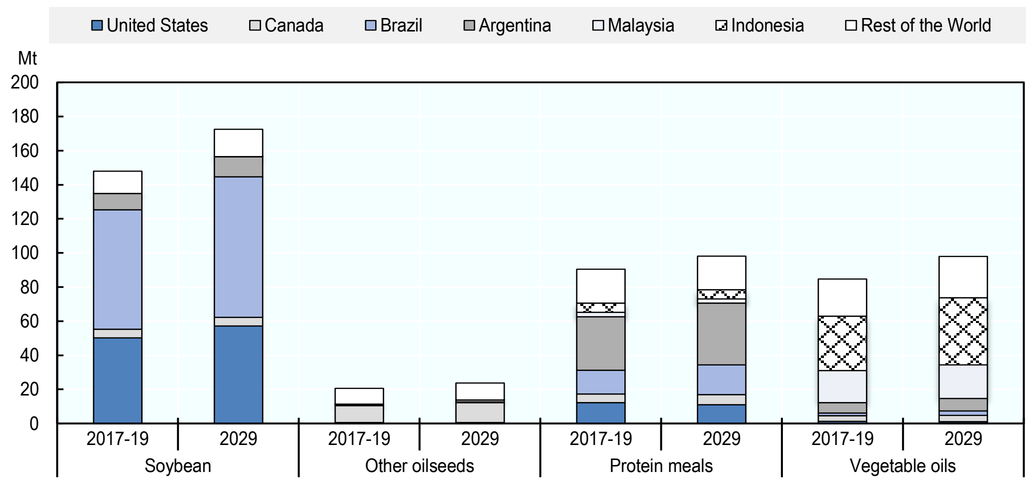
Vegetable oil includes oil obtained from the crushing of soybeans and other oilseeds (about 55% of world vegetable oil production), palm oil (35%), as well as palm kernel, coconut and cottonseed oils. In view of a slowdown in the expansion of the mature oil palm area, further production growth in Indonesia (1.7% p.a.) and Malaysia (0.8% p.a.) is projected to be limited. In addition, the rise in Indonesia's domestic biodiesel requirement will place upward pressure on global vegetable oil supplies in the medium term. Global demand for vegetable oil is projected to expand by 37 Mt by 2029, which is likely to draw down high inventories and support vegetable oil prices over the outlook period.

Soybean meal dominates protein meal production and consumption. Compared to the past decade, the expansion of protein meal utilisation (1.4% p.a. vs. 3.6% p.a.) is expected to be constrained by slower growth in global production of pork and poultry, and by efforts in China to adopt a lower protein meal share in livestock feed rations. As a result, Chinese protein meal use is expected to grow slightly slower than animal production. Total protein meal consumption is expected to decline in the European Union as growth in animal production slows down and other protein sources are increasingly used in the feed mixtures.

Vegetable oil has one of the highest trade shares (40%) of production of all agricultural commodities. Indonesia and Malaysia, the world's two main suppliers of palm oil – the greatest single component of vegetable oil – will continue to dominate vegetable oil trade (Figure 4.1), exporting over 70% of their combined production and jointly accounting for nearly 60% of global exports. India, the number one importer of vegetable oil in the world, is projected to maintain a high import growth of 3.2% p.a. due to a growing population and higher incomes.

Growth in world trade of soybeans, dominated by the Americas, is expected to slow considerably in the next decade, a development directly linked to the projected slower growth in the crushing of imported soybeans in China. In parallel, Brazil will consolidate its position as the world's largest exporter of soybean.

Figure 4.1. Exports of oilseeds and oilseed products by region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Protein meal demand is linked to the expansion of animal production. The uncertainty around the future of pork production due to African swine fever in East Asia could affect the projections as pork might be replaced in the long term by other animal protein (e.g. poultry and fish) requiring less feed in the production. The outbreak of several diseases in China's pig herd during recent years induced a slowing of demand for protein meal and remains a large uncertainty over the outlook period. In addition, concerns about genetically modified products have led growing numbers of European Union milk producers to refrain from using genetically modified products as feed, especially soybean meal. This might further reduce protein meal demand as the European Union accounted for 15% of world protein demand in 2017-19.

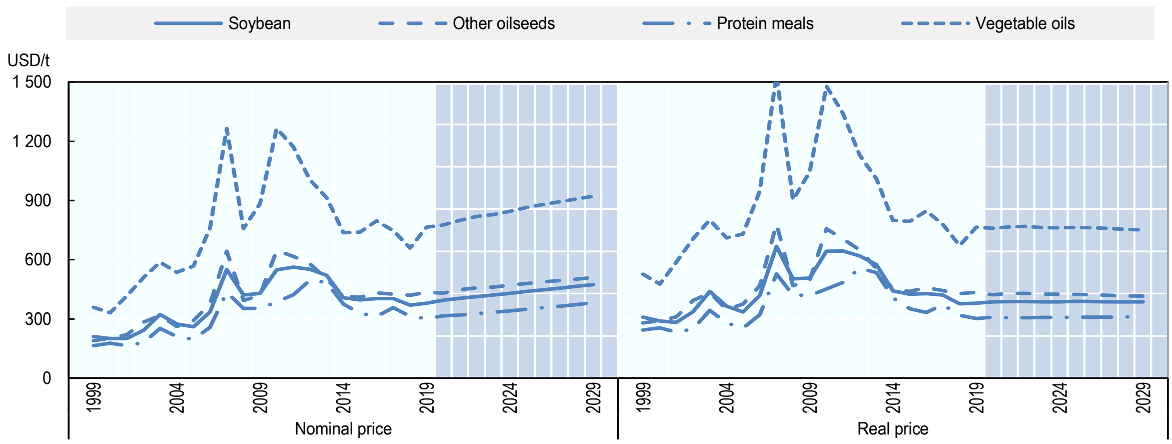
The scope to increase palm oil output in Indonesia and Malaysia will increasingly depend on replanting activities and accompanying yield improvements (as opposed to area expansion), which in recent years have been sluggish given the low profitability of the sector, rising labour costs in Malaysia, and the limited scale of public replanting programmes in Indonesia, especially for small-holders. Progress has been reported for major palm oil companies in Indonesia, where old palm oil plantations have been uprooted and replanted with higher yielding palms. Sustainability concerns also influence the expansion of palm oil output as demand in developed countries favours oils that are not associated with deforestation and consumers seek sustainability certifications for vegetable oil used as biodiesel feedstock and, increasingly, for vegetable oils entering the food chain.

4.3. Prices

The price of oilseeds and oilseed products increased in 2019 as supply increased slower than demand. Stocks, however, remain ample. The assumed stable real price of crude oil and sustained economic growth should support the price of oilseed and oilseed products over the projection period, whereas continued productivity growth will put downward pressure on real prices. The COVID-19 pandemic reduced economic activity in 2020 and could have a considerable impact on the development over the next decade.

Real prices for soybean, other oilseed, vegetable oil and protein meal are projected to decline slightly as productivity growth is expected to keep pace with growing demand over the coming ten years. Real prices will nonetheless remain above historical troughs (Figure 4.2). In nominal terms, prices of oilseeds and oilseed products are expected to rise over the medium term, although they are not expected to attain previous highs.

Figure 4.2. Evolution of world oilseed prices



Note: Soybeans, US, c.i.f. Rotterdam; Other oilseeds, Rapeseed, Europe, c.i.f. Hamburg; Protein meal, production weighted average price for soybean meal, sunflower meal and rapeseed meal, European port; Vegetable oil, production weighted average price for palm oil, soybean oil, sunflower oil and rapeseed oil, European port. Real prices are nominal world prices deflated by the US GDP deflator (2019=1).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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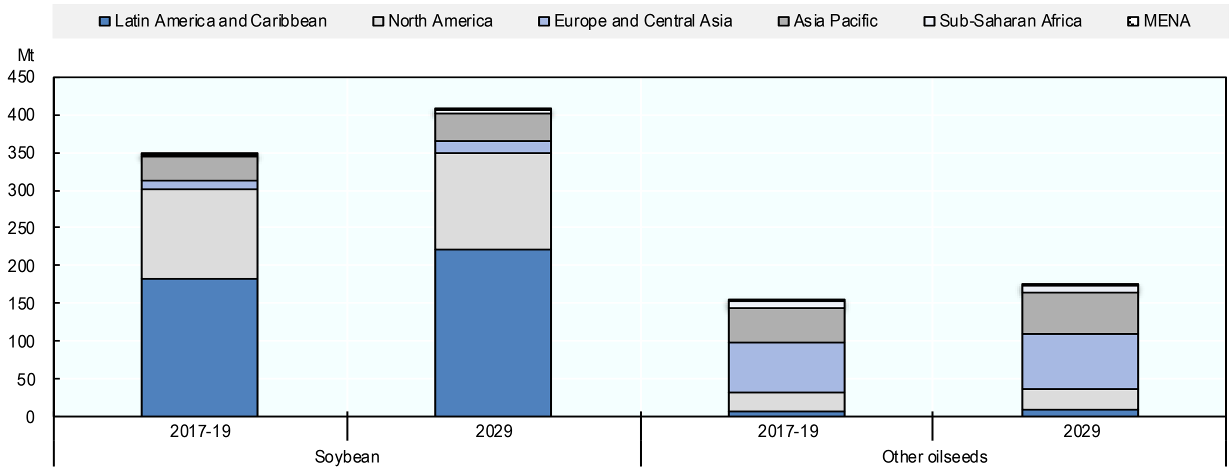
4.4. Oilseed production

The production of soybeans is projected to grow by 1.3% p.a., compared to 4.0% p.a. over the last decade. The production of other oilseeds (rapeseed, sunflower seed, and groundnuts) will grow at a slower pace, at 1.2% p.a. compared to 2.8% p.a. over the previous ten years (2010-2019). Growth in other oilseeds is dominated by yield increases, accounting for 78% of production growth, compared to 66% of overall production growth derived from yields in the case of soybeans. Soybeans benefit from their fast growth, which allows for double-cropping production, especially in Latin America.

Brazil and the United States are currently producing similar amounts of soybeans (around 115 Mt in 2017-19), but over the next decade, the projected growth in Brazil (1.5% p.a.) should be stronger than in the

United States (0.6% p.a.), mainly due to the possibility of increased cropping intensity by double cropping soybean with maize. Overall, the production of soybeans is projected to grow strongly in Latin America, with Argentina and Paraguay producing 61 Mt and 12 Mt respectively by 2029 (Figure 4.3). In China, after a decade in which production decreased, soybean production is expected to resume growth in response to reduced policy support for the cultivation of cereals. Soybean production is also expected to grow in India, the Russian Federation, Ukraine, and Canada.

Figure 4.3. Oilseed production by region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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China (which produces mainly rapeseed and groundnuts) and the European Union (a major producer of rapeseed and sunflower seed) are the most important producers of other oilseeds, with projected annual output of 31 Mt and 27 Mt respectively by 2029. However, limited growth in output is projected for both regions (1.0% p.a. for China and -0.02% p.a. for the European Union) as relatively higher prices for cereals are expected to generate strong competition for limited arable land. Canada (23 Mt in 2029), another major producer and the largest exporter of rapeseed, is projected to increase its production by 1.9% p.a. Strong growth in other oilseed production is projected for Ukraine and the Russian Federation, in line with the ongoing expansion of the agricultural sector in the Black Sea region. In India, other oilseeds production is expected to expand faster over the next ten years as the government continues to support production in order to respond to increasing domestic demand for vegetable oils and protein meal (see discussion below).

Soybean stocks are projected to remain unchanged, which implies that the world stock-to-use ratio would decline from 12.4% in 2017-19 to 11.3% in 2029. Given the global trend to gradually concentrate oilseed production in a few major producing countries, the declining stock-to-use ratio could result in increased price volatility.

4.5. Oilseed crush and production of vegetable oils and protein meal

Globally, the crushing of soybeans and other oilseeds into meal (cake) and oil accounts for about 90% of total usage. The demand for crush will increase faster than demand for other uses, notably direct food consumption of soybeans, groundnuts and sunflower seeds, as well as direct feeding of soybeans. The crush location depends on many factors, including transport costs, trade policies, acceptance of genetically modified crops, processing costs (e.g. labour and energy), and infrastructure (e.g. ports and roads).

In absolute terms, soybean crush is projected to expand by 56 Mt over the outlook period, well below the 103 Mt of the previous decade. Chinese soybean crush is projected to increase by 22 Mt, accounting for about 40% of the world's additional soybean crush, the bulk of which will utilise imported soybeans. The growth in China although large is projected to be considerably lower than in the previous decade. Crush of other oilseeds is expected to grow in line with production and to occur more often in the producing country compared to soybeans. This implies a much lower trade share for other oilseeds than for soybeans.

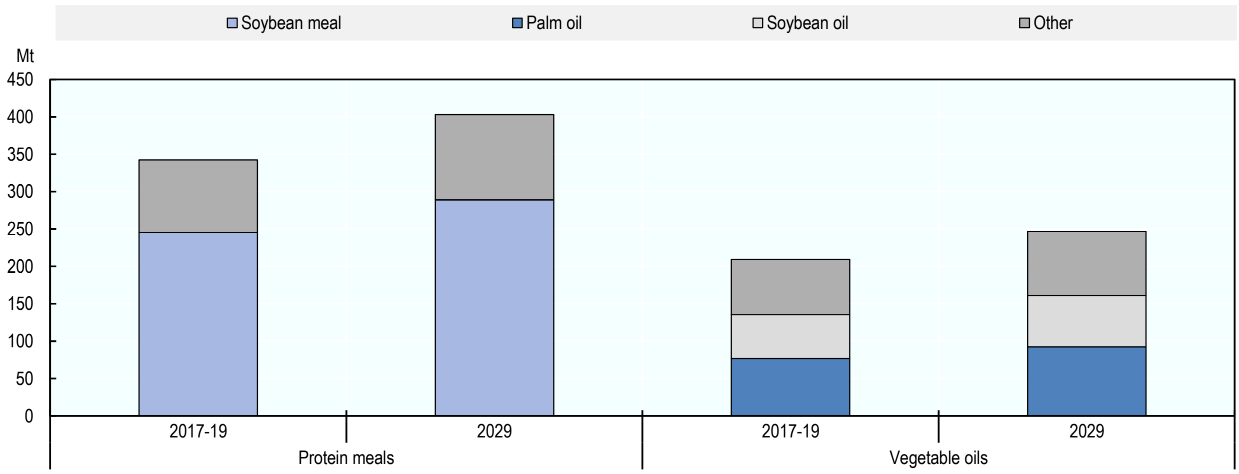
Global vegetable oil production depends on both the crush of oilseeds and the production of perennial tropical oil plants, especially palm oil. Global palm oil output has outpaced the production of other vegetable oils in the past decade. However, growth in production of palm oil is expected to weaken due to increasing sustainability concerns and efforts to reduce deforestation caused by the oil palm plantations in Indonesia and Malaysia. These two countries account for more than one-third of the world's vegetable oil production.

At the global level, palm oil supplies are projected to expand at an annual rate of 1.5%. Increasingly stringent environmental policies from the major importers of palm oil and sustainable agricultural norms (e.g. in the context of the 2030 Agenda for Sustainable Development) are expected to slow the expansion of the oil palm area in Malaysia and Indonesia. This implies that growth in production comes increasingly from productivity improvements, including an acceleration of replanting activities. Palm oil production in other countries is expected to expand more rapidly from a low base, mainly for domestic and regional markets. For example, Thailand is projected to produce 3.8 Mt by 2029, Colombia 2.4 Mt, and Nigeria 1.4 Mt. In certain countries of Central America, niche palm oil production is developing from the outset with global sustainability certifications in place, positioning the region to eventually reach broader export markets.

The vegetable oil aggregate includes palm kernel, coconut and cottonseed oil, as well as palm oil and oil extracted from the crush of oilseeds as analysed above. Palm kernel oil is produced alongside palm oil and follows the production trend of the latter. Coconut oil is mainly produced in the Philippines, Indonesia, and oceanic islands. Palm kernel oil and coconut oil have important industrial uses, and dominance has shifted towards palm kernel oil along the growing production of palm oil. Cottonseed oil is a by-product of cotton ginning, with global production concentrated largely in India, the United States, Pakistan, and China. Overall, vegetable oil production is projected to increase globally by 1.4% p.a., a higher rate than most agricultural commodities covered in this *Outlook*, driven mainly by food demand in developing countries resulting from population and income growth.

Global protein meal output is projected to expand by 1.4% p.a., reaching 403 Mt by 2029. World production of protein meals is dominated by soybean meal, which accounts for more than two-thirds of world protein meal production (Figure 4.4). Production is concentrated in a small group of countries. Argentina, Brazil, China, the European Union, India, and the United States are projected to account for 73% of global production by 2029. In China and the European Union, most protein meal production comes from crushing of imported oilseeds, primarily soybeans from Brazil and the United States. In the other important producing countries, domestically produced soybeans and other oilseeds are the dominant raw material.

Figure 4.4. Protein meal and vegetable oil production by type



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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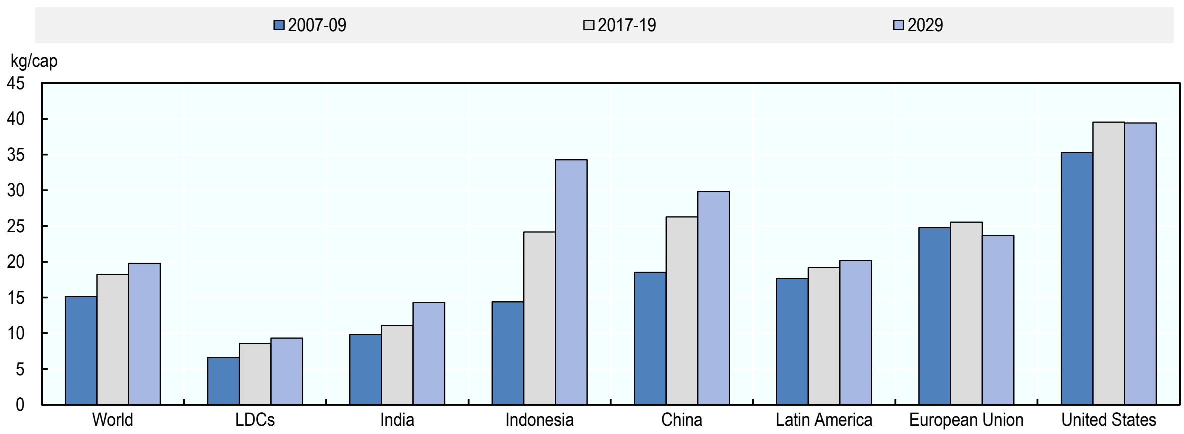
4.6. Vegetable oil consumption

Due to saturated per capita food demand, per capita consumption of vegetable oil for food is projected to grow by 0.9% p.a., considerably less than the 2.3% p.a. increase observed during 2010-19. In China (30 kg/capita) and Brazil (24 kg/capita), the per capita level of vegetable oil food availability is set to reach levels comparable to those of developed countries, for which growth in vegetable oil food consumption is projected to level off at 27 kg/capita, growing at 0.6% p.a. (Figure 4.5).

Figure 4.5. Per capita food availability of vegetable oil in selected countries



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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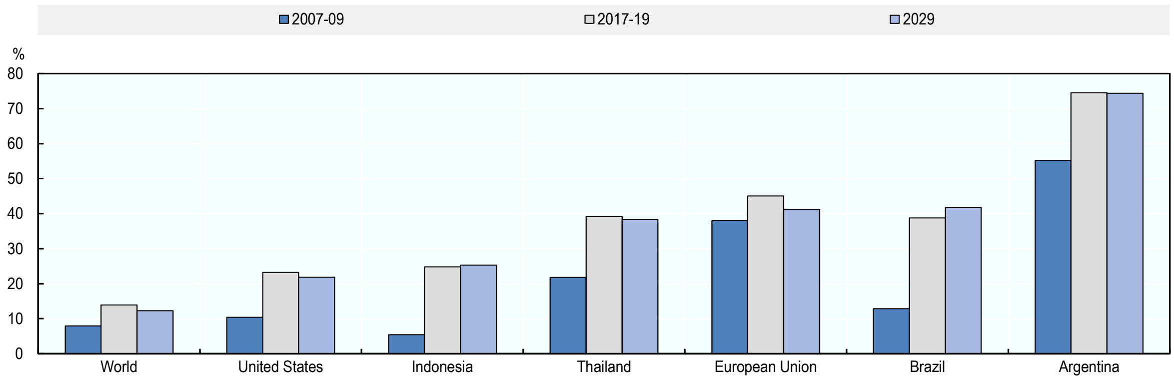
India, the world's second largest consumer and number one importer of vegetable oil, is projected to maintain a high per capita consumption growth of 2.3% p.a., reaching 14 kg/capita by 2029. This substantial growth will be the result of both expansion of its domestic production, crushing of increased domestic oilseed production, and a further increase in imports of mainly palm oil from Indonesia and Malaysia. For least developed countries (LDCs), the per capita availability of vegetable oil is projected to increase by 0.8% p.a., to reach 9 kg per capita by 2029. As urbanisation increases in developing countries, dietary habits and traditional meal patterns are expected to increasingly shift towards more processed food having a high content of vegetable oil.

The uptake of vegetable oil as feedstock for biodiesel is projected to increase at considerably slower pace over the next ten years, compared to the 4.3% p.a. increase recorded over the previous decade when biofuel support policies were taking effect. In general, national targets for mandatory biodiesel consumption are expected to increase less than in previous years. In addition, used oils, tallow, and other feedstocks are increasing their share in the production of biodiesel largely due to specific policies (see Chapter 9 for more details on biofuels). Argentina is expected to maintain an export-oriented biodiesel industry (more than half of the biodiesel produced is exported). Vegetable oil uptake by Argentina's biodiesel industry is projected to be 3.1 Mt by 2029, equivalent to 74% of domestic vegetable oil consumption (Figure 4.6). In Indonesia, the growth in the use of vegetable oil to produce biodiesel is projected to remain strong due to supportive domestic policies. Thus, Indonesia is the main driver for the increasing use of vegetable oil as feedstock for biodiesel in the world. The use of vegetable oil as feedstock for biodiesel depends of the policy setting (see Chapter 9) and the relative price development of vegetable oil and crude oil (see below).

Figure 4.6. Share of vegetable oil used for biodiesel production



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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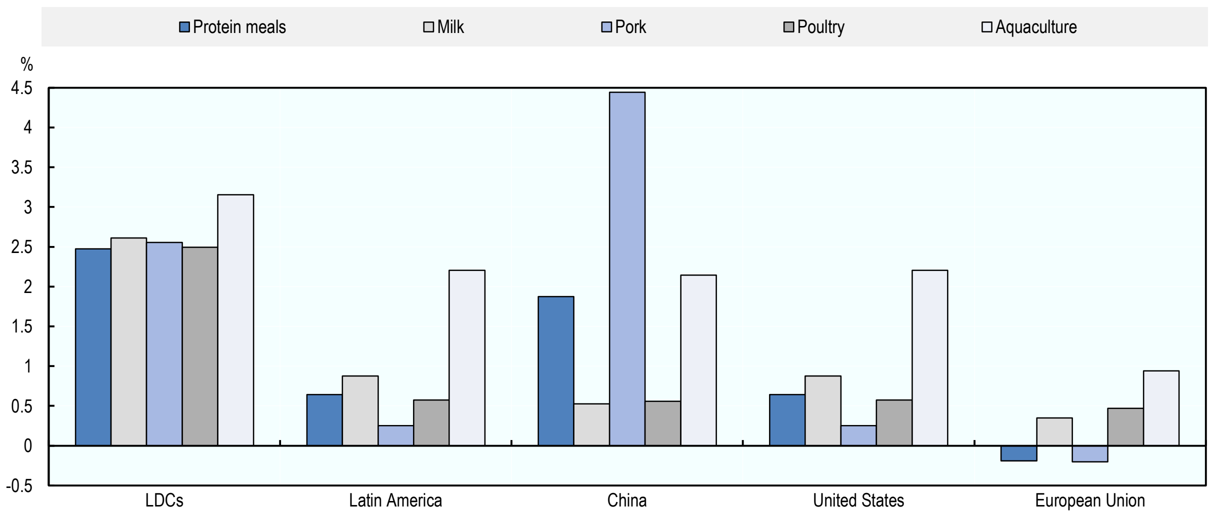
4.7. Protein meal consumption

Protein meal consumption is projected to continue to grow at 1.4% p.a., considerably below the last decade's growth rate of 3.4% p.a. The growth in protein meal consumption is closely linked to the development of feed demand, as protein meal is exclusively used as feed. Several factors influence the link between feed use of protein meal and animal production: intensification of animal production increases demand for protein meal, whereas feeding efficiencies led to a reduction of protein feed per animal production output; composition of animal husbandry and herd sizes are additional determining factors. The link between animal production and protein meal consumption is associated with a country's degree of economic development. Lower income countries, who rely on backyard production, consume less protein meal and whereas higher income economies who employ intensive production systems, use higher amounts of protein meal. As economies develop, production shifts towards more feed-intensive production systems, and protein meal consumption increases (Figure 4.7).

Because of a shift to more feed-intensive production systems in developing countries in response to rapid urbanisation and increasing demand for animal products, growth in protein meal consumption tends to exceed growth in animal production. In LDCs, where the use of protein meals is very low, intensification in livestock production with more widespread use of compound feed is expected to continue. With intensification, the use of protein meal per unit of livestock production increases considerably leading to fast growth in total demand in these countries. In countries such as the United States and in the European Union, where compound feed satisfies most protein requirements of animal production, protein meal consumption is expected to grow slower than animal production due to improving feeding efficiencies. In addition, animal products are increasingly marketed in the European Union as produced without feed use from genetically modified crops.

Growth of protein meal consumption in China is projected to decline from 5.0% p.a. in the last decade to 1.9% p.a. Growth in China's demand for compound feed is expected to shrink due to declining growth rates for animal production and the existing large share of compound feed-based production. Furthermore, the protein meal content in China's compound feed is expected to remain stable as it surged in the last decade and considerably exceeds at present the levels found in the United States and European Union.

Figure 4.7. Average annual growth in protein meal consumption and animal production (2020-29)



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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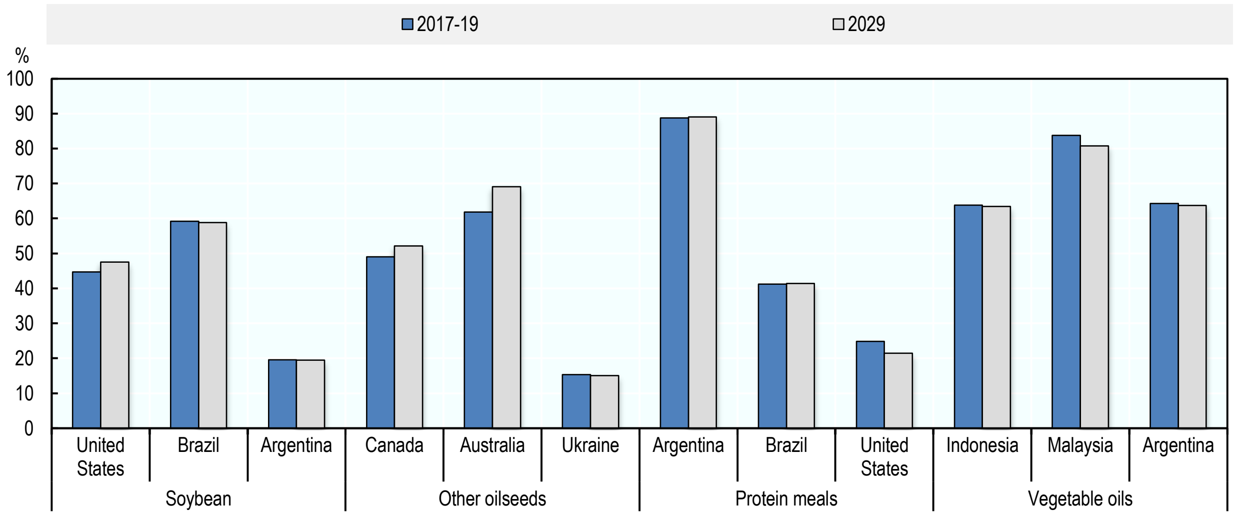
4.8. Trade

Over 40% of world soybean production is traded internationally, a high share compared to other agricultural commodities. Compared to the previous decade, the expansion in world soybean trade is expected to decelerate considerably during the outlook period. This development is directly linked to projected slower growth of the soybean crush in China and subsequent imports. Chinese soybean imports are projected to grow by 1.8% p.a. to about 105 Mt by 2029, accounting for about two-thirds of world soybean imports. Exports of soybeans originate predominately from the Americas – the United States, Brazil and Argentina – and are projected to account for a stable 88% of world soybean exports by 2029. Whereas the United States was historically the largest global exporter of soybeans, Brazil has taken over that role with steady growth in its export capacity. By 2029, it is projected that Brazil will account for 48% of total global exports of soybean, 1 percentage point higher than currently.

For other oilseeds, its share of global production traded is much lower at about 14% of world production. Important exporters are Canada, Australia, and Ukraine, which are projected to account for more than 73% of world exports by 2029. In Canada and Australia, more than half of the other oilseed (rapeseed) production is exported (Figure 4.8). Additional oilseed production is often exported in the form of vegetable oil or protein meal.

Figure 4.8. Share of exports in total production of oilseeds and oilseed products for the top three exporting countries



Note: The figure only shows the direct share of exports and does not include the export of further processed products, which would lead to higher export shares.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Vegetable oil exports, which amount to 40% of global vegetable oil production, continue to be dominated by a few players. Indonesia and Malaysia are expected to continue to account for 60% of total vegetable oil exports during the outlook period. Argentina is projected to become the third largest exporter (mainly of soybean oil), with about 7.4% of the world vegetable oil exports by 2029. In all three countries, it is expected that more than two-thirds of the domestic production of vegetable oil will be exported. However, this share is projected to contract slightly in Indonesia and Malaysia as domestic demand for food, oleochemicals, and, especially, biodiesel uses is expected to grow. India is projected to continue its strong growth in imports at 3.2% p.a., reaching 22 Mt by 2029, or about a quarter of world vegetable oil imports, in order to respond to an increasing demand driven by population growth, urbanisation, and increases in disposable income.

The projected growth in world trade of protein meal is around 0.8% p.a. over the outlook period, down from 1.8% p.a. during the last decade, and will be characterised by a declining share of trade in global production. This shift is projected as the global expansion of meat production will be concentrated in the main oilseed-processing countries, where the use of locally-produced protein meal will increase, and thus trade will expand only slightly. Argentina is expected to remain the largest meal exporter because it is the only major protein meal producer with a clear export orientation. The largest importer is the European Union, with imports expected to decline. Almost all of the 8 Mt global import growth in protein meal is projected to occur in Asia, especially in Viet Nam, Indonesia, and Thailand where additional growth will come with the recovery from the African Swine Fever (ASF) outbreak. Domestic crushing capacity in these countries is not expected to keep pace with protein meal demand, and expansion of the livestock sector is expected to require imported feed to meet production requirements.

4.9. Main issues and uncertainties

The pandemic spread of the COVID-19 has resulted in a reduction of movement with strong implications for away-from-home consumption. This could affect demand for vegetable oil, which is widely used for deep-frying. In addition, the decline in economic activity combined with reduced crude oil price curb the demand for vegetable oil as biodiesel feedstock. Most production and processing of oilseeds and products is highly mechanised and labour mobility is of less importance. Nevertheless, some disruption in palm oil and coconut harvesting due to restrictions on mobility have been reported. In addition, the long-term implications depend on the speed of the economic recovery as vegetable oil consumption per capita grows strongly with economic growth and protein meal is used as feed in the more elastic animal production.

Consumer concerns regarding soybeans stem from the high share of soybean production derived from genetically modified seeds. In the European Union in particular, certification schemes of animal products based on feed free of genetically modified products are gaining momentum and may shift feed demand to other protein sources. Environmental concerns are also on the rise, especially with respect to a potential link between deforestation and increasing soybean production in Brazil and Argentina. These concerns have motivated the private sector to incentivise the use of land already cleared for further area expansions and to refrain from additional deforestation. If successful, these voluntary initiatives should discourage further clearing of land by soybean producers.

The scope for increasing palm oil output in Indonesia and especially in Malaysia will increasingly depend on replanting activities and yield improvements (as opposed to area expansion). In recent years, growth in production has been sluggish given the low profitability of the sector and rising labour costs in Malaysia. There has been some replanting progress by major palm oil companies in Indonesia. Sustainability concerns also influence the expansion of palm oil output as demand in developed countries favours deforestation-free oils and seeks sustainability certifications for vegetable oil used as biodiesel feedstock and, increasingly, for vegetable oils entering the food chain. Several certification schemas operate and are widely used in Malaysia and Indonesia.

Certification schemes, labelling, and environmental legislation might curb area expansion in key palm oil-producing countries and purchases by major importers, which would eventually affect supply growth. These concerns present specific constraints to the further expansion of oil palm plantations and exports of palm oil from Malaysia and Indonesia.

The development of crude oil prices, which affects the profitability of biodiesel production, also remains a major source of uncertainty in the vegetable oil sector. The fastest growth in biodiesel production is expected in Indonesia, but the relationship between palm oil and crude oil prices, as well as economic development can considerably alter the projected growth path. In the European Union, policy reforms and the emergence of second-generation biofuel technologies will likely prompt a shift away from crop-based feedstocks. Biofuel policies in the United States, the European Union, and Indonesia remain a major source of uncertainty in the vegetable oil sector given that about 12% of global vegetable oil supplies go to biodiesel production. In Indonesia, the attainability of the recently proposed 30% biodiesel mandate remains questionable as it may impose medium-term supply constraints.

Protein meals compete in part with other feed components in the production of compound feed and are thus reactive to any change in cereal prices. In addition, changing feeding habits, especially in the cattle sector, can alter the demand for protein meals. Ongoing adjustments in domestic cereal prices in China, for example, will affect the composition of its compound feeds, which currently contain a higher share of protein meal than in developed countries and other major emerging economies. The rate of recovery of the Chinese pigmeat industry from ASF and COVID-19 will have a large influence on feed demand for livestock as a faster recovery of pig production requires more protein meal for feeding.

5. Sugar

This chapter describes the market situation and highlights the medium-term projections for world sugar markets for the period 2020-29. Price, production, consumption and trade developments for sugar beet, sugar cane, sugar, molasses, and high-fructose corn syrup are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world sugar markets during the coming ten years.

5.1. Market situation

In the current sugar marketing season (October 2019-September 2020), production is expected to decrease significantly, compared to the last two surplus seasons, which saw India surpassing Brazil as the world's leading sugar producer.[1] However, Brazil should recover its leading position as India's production is affected by unfavourable weather conditions. Dry weather has also affected production in the European Union and Thailand, both important sugar markets. The only marked increase in sugar output occurs in the Russian Federation, where a bumper crop is expected to lead to an oversupplied market. Globally, the production level of the current season will be close to the average level of the last decade.

Global per capita consumption for caloric sweeteners continues to rise, albeit with noticeable regional differences. It has reached high levels in developed countries, South America and some Asian sugar producing countries, where growth is low or even negative. In Africa and most of Asia (Figure 5.1), consumption levels are low and expected growth is strong. The COVID-19 pandemic is having a strong impact on demand. Out-of-home consumption has decreased significantly as a result of the physical distancing measures and other restrictions imposed to reduce the spread of the virus. It is now widely recognised that high levels of sugar consumption can contribute to illnesses and health problems including diabetes, overweight and obesity. In response, countries with high sugar consumption are taking action to reduce sugar intake.

Previous to the outbreak of the coronavirus, sugar inventories were shrinking, with nearly half of the destocking taking place in India. Currently, with uncertain consumption and trade, the final state of global stocks for the season is also uncertain.

5.2. Projections highlights

In real terms, raw and white sugar prices are expected to remain flat over the projection period, while in nominal terms, prices are projected to trend slightly upward (+2% p.a.). This is a result of a projected tighter world market balance (supply closer to demand) than in the past decade. The relatively small white sugar premium (the difference between white and raw sugar prices), USD 70/t during the base period (2017-2019), is projected to increase slightly in absolute terms to USD 83/t by 2029.

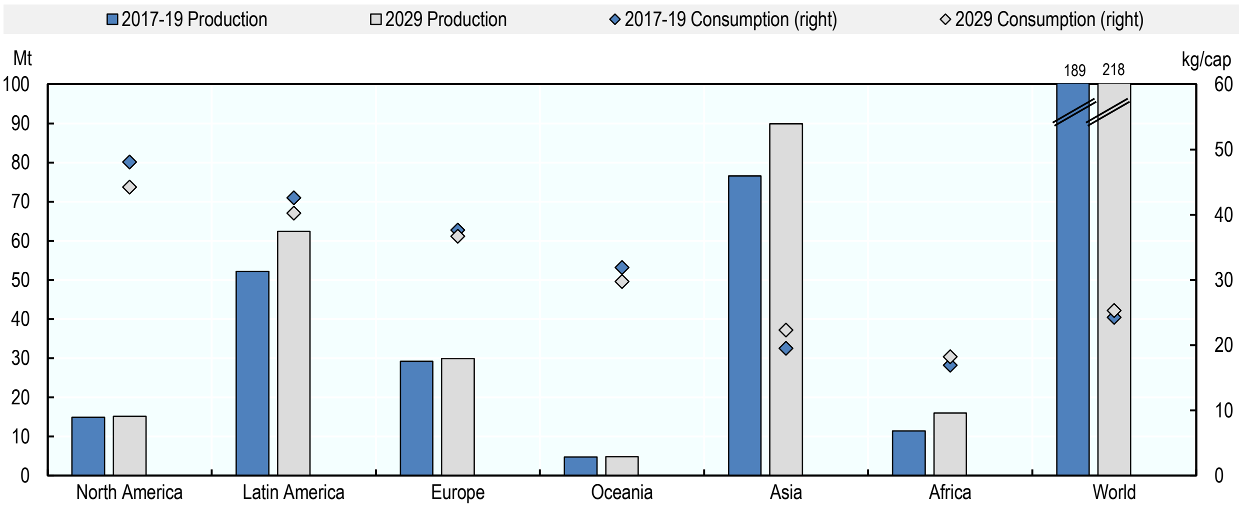
Sugarcane and sugar beet production are both projected to grow, driven by both area expansion and yield improvements. Growth is expected to be greater for sugarcane due mainly to faster area expansion. Sugar beet production and processing is more mechanised and will continue to benefit from productivity gains. Sugarcane, cultivated predominantly in tropical and sub-tropical countries of Asia, Latin America, and Africa, will continue to be the main crop used to produce sugar.

Global sugar production is projected to recover from the current dip and expand by 15%, from 176 Mt in the base period to 203 Mt by 2029, with 96% of the projected increase originating from developing countries. The economic assumptions underlying the projections, notably the depreciation of the Brazilian real *vis-à-vis* the US dollar, will help towards a resumption of investment in the sector, with Brazil's sugar export prices attractive enough to boost its production for the international markets. Starting on 1 January 2020, Renovabio, Brazil's federal program to curb carbon emissions will increase the consumption of ethanol thereby benefit the sugarcane industry. Brazil is projected to maintain its position as the world's largest sugar producer and to account for about 18% of the world's sugar output by 2029. India and Thailand are expected to progressively recover from their current low production season, with India reaching levels close to those of Brazil by 2029. In absolute terms, and when compared to the base period, the major changes in global production are projected for Brazil (+7.0 Mt), India (+4.6 Mt), Thailand (+2.8 Mt), and the People's Republic of China (hereafter "China") (+1.4 Mt). In response to the higher nominal prices and the increasing global consumption, the average annual growth rate of sugar production is expected to be slightly higher than that of the last decade.

Driven by sustained economic expansion and moderate population growth, sugar demand in Asia is expected to represent more than half of global consumption by 2029. In absolute terms, Africa will experience a similar population increase to that of Asia, although the increase in its consumption of sugar should be significantly lower. Sugar consumption growth in Africa (in absolute terms) is projected to be less than half that projected for Asia. In terms of per capita consumption, a slight slowdown in the growth rate is expected in both regions.

In other parts of the world, especially in high-income countries, per capita consumption will continue to decline as a result of changing consumer habits regarding sugar intake. Consumption of the main alternative caloric sweetener, high fructose corn syrup (HFCS), is projected to increase by 1.9 Mt to reach 15 Mt in 2029, driven mainly by an increase in demand from China, where per capita consumption levels are very low. Increasing awareness of the health effects of high levels of consumption of caloric sweeteners reinforced by policy actions will impact consumption trends. Sugar and HFCS will continue to represent about 90% of the sweetener market.

Figure 5.1. Global caloric sweeteners: Production and per capita consumption in 2017-19 and in 2029



Note: Sweeteners include sugar and high fructose corn syrup
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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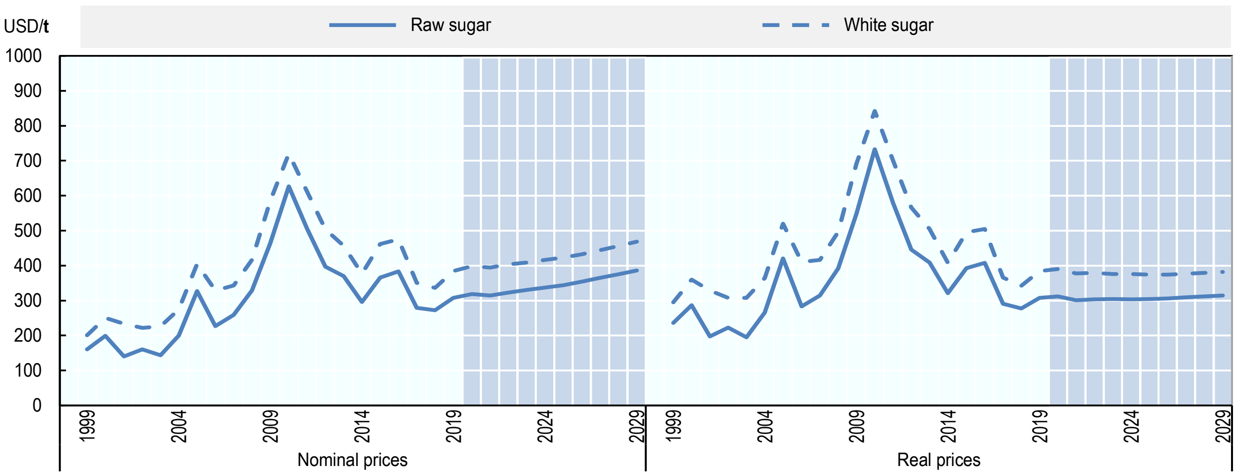
The projections are based on several assumptions, which include productivity trends, macro-economic conditions, and national domestic policies for the sugar subsector. In the short term, the COVID-19 pandemic is the greatest source of uncertainty, affecting macroeconomic conditions, consumption and trade. However, it could affect 2020/2021 production in the labour-intensive production systems of India and Thailand. In addition to the pandemic, a main source of uncertainty for the *Outlook* relates to the allocation of the sugarcane between ethanol and sugar in Brazil. Crude oil price fluctuations and the Renovabio ethanol program could have significant effects on the international market for sugar by altering the export levels from Brazil. Production in India is characterised by frequent production swings and these could impact the international market, given that India is also the world's largest consumer. India and Thailand also have bioethanol projects that, if realised, could decrease the availability of cane for sugar production, strongly impacting markets as well. Heightened concerns over health issues associated with excessive caloric sweetener consumption are also a source of uncertainty, as they can curtail growth in demand to levels lower than in this *Outlook*. Finally, the fact the sugar sector remain highly regulated constitutes a source of uncertainty for the projections.

5.3. Prices

Sugar prices decreased in recent years to levels not seen since the middle of the last decade. In nominal terms, they are projected to increase over the outlook period. With a return to higher profitability, the main exporters (mainly Brazil) will resume their sugar exports. Assuming normal weather conditions, sugar crop yields, notably in India and Thailand, are expected to progressively come back to levels more in line with the trend of previous years. Growth in world demand is foreseen to remain within the range of the growth observed in the previous decade. This results in flat real sugar prices over the course of the outlook period. In absolute terms, global stocks are expected to replenish slowly. In relative terms, from 2022 on, they stabilise at a stock-to-use ratio of close to 44.7%.

Over the medium term, real sugar prices are expected to remain at the levels of 2019 (Figure 5.2), i.e. lower than the average of the last 20 years, where prices experienced upward pressure through the competition from biofuels (ethanol). By 2029, the nominal world price is projected to be USD 386/t (USD 17.5cts/lb) for raw sugar and USD 469/t (USD 21.3cts/lb) for white sugar. The white sugar premium is projected to grow slightly to USD 83/t by the end of the outlook period, as a result of a slightly increasing demand.

Figure 5.2. Evolution of world sugar prices



Note: Raw sugar world price, Intercontinental Exchange contract No.11 nearby futures price; Refined sugar price, Euronext Liffe, Futures Contract No. 407, London. Real sugar prices are nominal world prices deflated by the US GDP deflator (2019=1).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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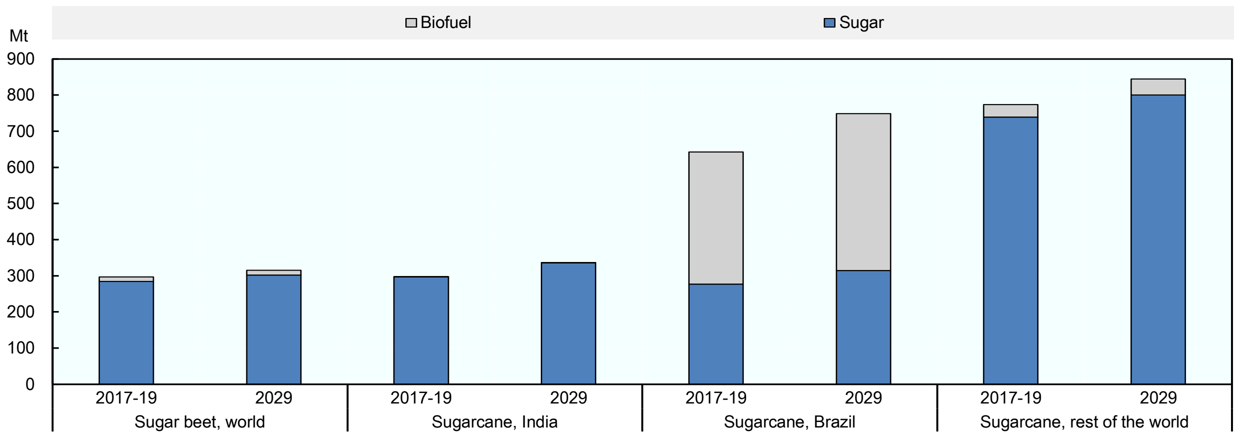
5.4. Production

Sugar markets are expected to undergo a slow recovery as the sector is capital-intensive and some investments were postponed due to low prices. Sugar production is foreseen to expand due to, among other things, the flexibility of sugar mills to shift between sugar and ethanol production, which reduces the investment risks. Sugarcane accounts for around 86% of the sugar crops and sugar beet makes up for the remainder. Sugarcane is a perennial crop that grows mainly in the tropical and sub-tropical regions. The same plants can be harvested for several years, although yields decline over time. In addition to sugar and ethanol, sugarcane can also be used to produce derivatives such as electricity (through bagasse surplus) and bioplastics. However, it remains a water-intensive crop. Conversely, sugar beet is an annual crop, cultivated mostly in temperate zones. This crop is used to produce a wide range of products, including food (sugar), feed, bio-based products for the industry (pharmaceuticals, plastics, textiles, and chemicals), and ethanol.

Over the outlook period, the increase in the production of sugarcane is foreseen to come from higher yields and area expansion. In the case of sugar beet, increases are expected to be due mainly from yields. Sugarcane production is projected to grow by 1.1% p.a., slightly higher than during the last decade, with Brazil, India, and Thailand anticipated to contribute to 74% of the change in global output volume (49%, 18%, and 6% respectively). Prospects are less robust for sugar beet with an anticipated production growth of 0.7% p.a., compared to 2.1% p.a. over the last decade (Figure 5.3). Expansions are expected in Egypt (+6.9 Mt), Ukraine (+3.3 Mt), Turkey (+2.9 Mt) and China (2.9 Mt), while contractions are projected in the European Union and the Russian Federation (-3.7 Mt and -1.1 Mt respectively), these two accounted for more than half of the global increase in sugar beet during the last decade.

Production growth in the European Union (with respect to 2017-2019, the post-quota period that began with a record sugar crop year) is projected to be one of the lowest. In the Russian Federation, despite a strong national strategy for auto-sufficiency from the past few years, which led to a massive production surplus in 2019, production costs should remain high and the sugar output is not expected to surpass the levels reached during the base period. In the US sugar sector, where both sugar crops are cultivated, higher yields are foreseen but increasing input costs (i.e. from improved harvesting technologies) will dampen production growth of sugar beet after a few years, while some growth in sugarcane production is expected as this crop is more stable given its perennial nature.

Figure 5.3. World sugar crops production



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Over the outlook period, the shares of sugar crops used for sugar and ethanol are projected to be about 78% for the production of sugar (75% in the case of sugarcane and 96% in the case of sugar beet) and 22% for ethanol. Brazil will continue to be the main producer of sugar and sugarcane-based ethanol, producing 39% of the world's sugarcane by 2029. This sugarcane will be used for 18% of global sugar production and 90% of global sugarcane-based ethanol production (compared to 17% and 91% during the base period).

As of 2020, world production is projected to increase again at a stronger average growth rate than in the previous decade (1.4% vs 0.8% p.a.), responding to attractive sugar prices driven by steady growth in global demand. Most of the production increases are expected to occur in developing countries, which are anticipated to represent 78% of global sugar production in 2029 (compared to 75% in the base period).

The leading regions are Asia and Latin America. Asia is projected to expand its share in global production from 41.2% during the base period to 41.6% in 2029, and Latin America from 29.2% to 30.2%.

Brazil, the world's biggest supplier, has been persistently in debt over the last ten years. The current world deficit, which is driving up prices, as well as the depreciation of the Real increase the profitability of this sector, thereby attracting investments. However, the sugar sector in Brazil will continue to be challenged by biofuels, with more than half of its sugarcane being used to produce ethanol. Brazil's dominance as the world's top producer and exporter will be maintained over the outlook period, however, with production projected to reach 37 Mt (+7 Mt compared to the base period) by 2029.

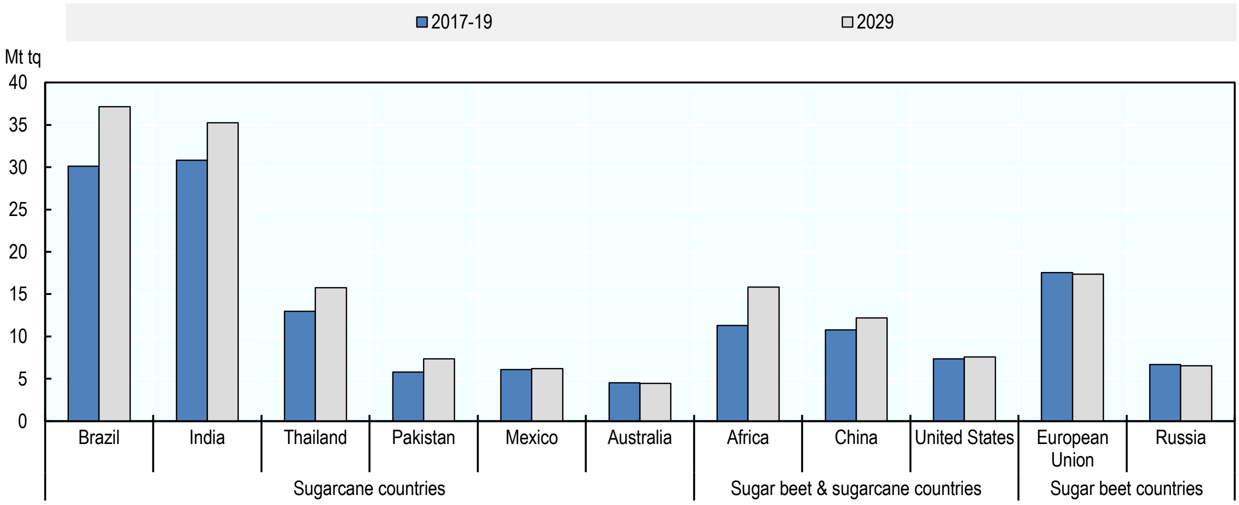
The world's second largest sugar producer is India, where production is expected to recuperate from the current lows and progressively expand, partly driven by renewed public support to this sector. On the back of remunerative returns, production is projected to increase by 4.4 Mt over the next decade, reaching 35 Mt in 2029. Thailand will maintain its market position as the world's fourth largest producer (the European Union is in the third place), and is projected to see a similar average annual growth to the one of the last decade, progressively recuperating from the slight decrease of the current season and stimulated by world sugar market prices. Thailand is projected to produce as much as 15.8 Mt by 2029. China is expected to experience accelerated growth in sugarcane and sugar beet production during the first years of the projection period, supported by the 2015-2020 National Plan. Production costs are expected, however, to remain high when compared to neighbouring countries. Some safeguard duties also limit competitive imports. These factors are expected to continue to protect the sector. By 2029, Chinese sugar production is projected to reach 12.2 Mt. In Pakistan, the government strongly support the sugar sector through guaranteed prices to farmers. Production is foreseen to increase, but at a lower growth rate per annum: 2.7% compared to 3.6% during the last decade, to reach 7.4 Mt by 2029.

In Africa (South Africa not included), growth in output will be driven by higher real sugar prices. Sugar output is projected to increase by 40% to reach 15.8 Mt by the end of 2029 compared to the base period, due to production expansion in Sub-Saharan countries that is supported by investments at the farm and the mill level. Despite this production growth, the continent will continue to represent a small share of the world output (8% in 2029).

During the last decade, developed countries accounted for more than one quarter of the increase of global sugar output, with significant growths in the European Union, the Russian Federation, Australia, and the United States. This share, however, is projected to decrease to 4% over the forecast period (Figure 5.4), with a projected growth of only 0.8% p.a. (being 1.7% p.a. in developing countries). In this group of countries and relative to the base period, only South Africa is foreseen to significantly extend its production (+0.5 Mt). In the European Union and the Russian Federation, production levels should not change much over the next ten years. Still, the European Union will maintain its position as the world's third largest producer. As for the Russian Federation, the efforts of recent years towards self-sufficiency have been successful, but the country remains a high cost producer with exports not competitive enough for production to continue to increase over the next decade. Not much change is expected in the United States as the sugar sector remains heavily influenced by government policies that support domestic production. These policies include: the Sugar Loan Program that support prices paid to farmers; the Sugar Marketing Allotments that either force or encourage producers to fulfil 85% of domestic consumption; the Feedstock Flexibility Program to divert any sugar surplus to ethanol production rather than sugar loan forfeitures to the USDA's Commodity Credit Corporation; and trade barriers that limit imports (through tariff rate quotas, regional agreements, and the Suspension Agreements on Sugar with Mexico).

After a period over the short term during which India will continue to undertake half of the world's sugar destocking, the market will return to surplus and global sugar stocks will increase moderately over the next decade. The global stock-to-use ratio is projected to return to a level close to its long-term average of 45% (from 49% in the base period).

Figure 5.4. Sugar production by crop



Note: Data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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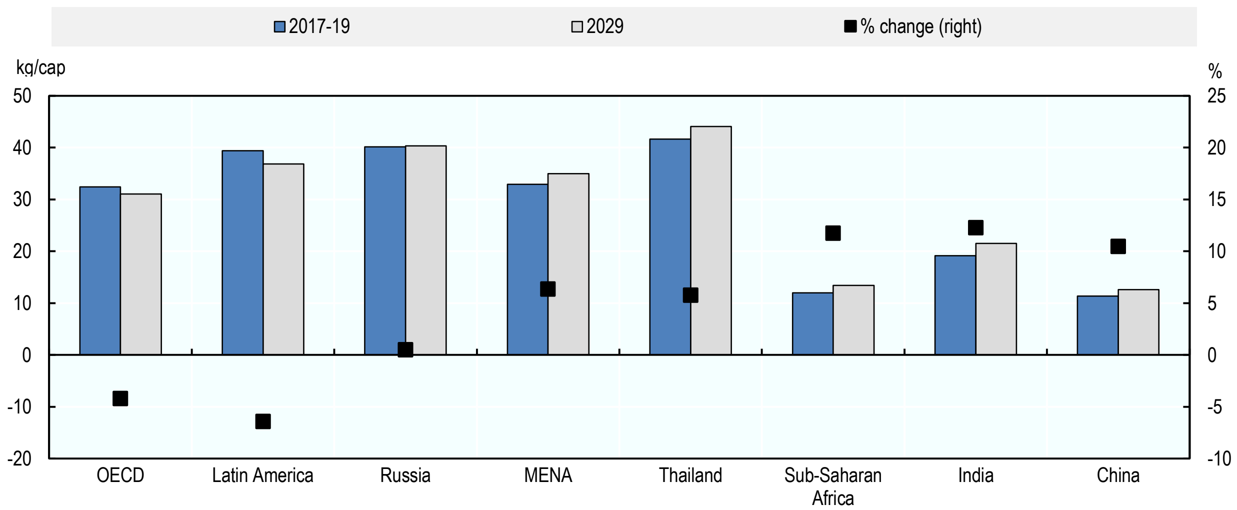
5.5. Consumption

Global sugar consumption is projected to continue growing at around 1.4% p.a., reaching 199 Mt by 2029, underpinned by population and income growth. Over the outlook period, the average world level of per capita consumption is expected to increase from 22.5 kg/cap to 23.5 kg/cap, although considerable variations between regions and countries will occur (Figure 5.5).

Figure 5.5. Per capita sugar demand in major countries and regions



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Increases in global sugar consumption over the next ten years are expected to come exclusively from the developing countries; declining trends are foreseen in other more mature markets in general. Asia and Africa will be the largest contributors to additional demand, with respectively 68% and 30% of additional demand. In those two sugar deficit regions, consumption levels are often low compared to other regions, and the prospects for growth are high. The higher growth rate in Asia will stem from a higher demand in sugar-rich confectionery products and soft drinks, generally in urban areas, while that of Africa will come from a higher direct consumption largely driven by population growth. In Latin America, which already has high per capita consumption levels, little growth is foreseen (2% over the entire outlook period).

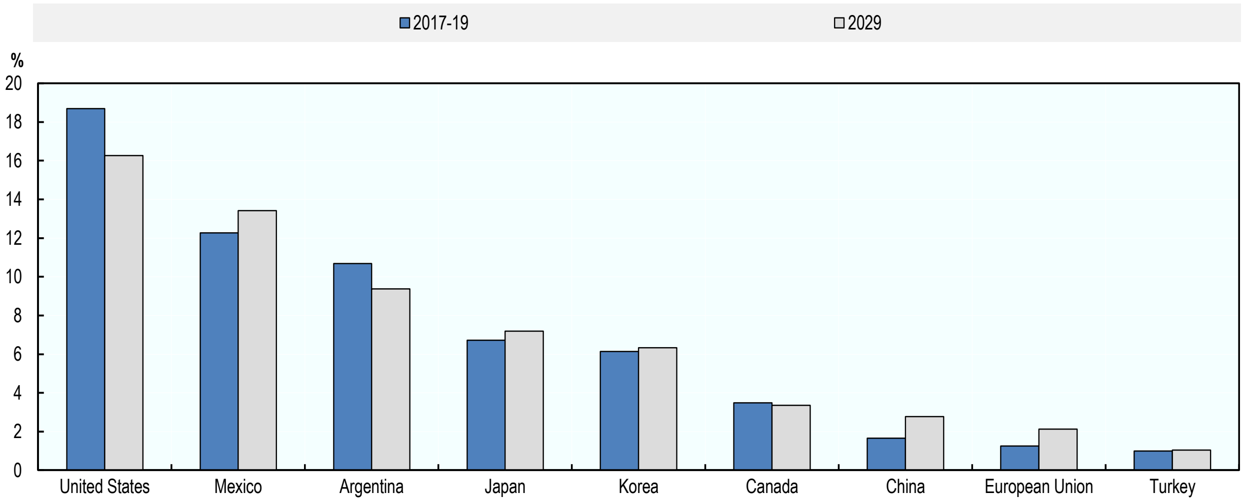
In Asia, it is expected that India, followed by Indonesia, China, and Pakistan, will experience the largest increases in sugar consumption. Per capita consumption is very low in China and LDC Asia (less than 13 kg per year during the base period), but the annual growth rate in these countries will not change much compared to the last decade as individuals do not favour sweet products and eating habits change slowly. In Africa, the highest increases in total consumption are projected for Egypt and several Sub-Saharan countries, but per capita consumption will remain below 14 kg per year in LDC Sub-Saharan countries, including Ethiopia and Nigeria.

In contrast, the level of sugar consumption per capita in many developed countries is expected to continue to decline due to increased concerns about negative health effects of sugar overconsumption: unhealthy weight gains that raise the risk of diabetes (type 2), heart disease and tooth decay. Several countries have implemented taxes on caloric sugary products in an attempt to reduce sugar consumption. Mexico was the first country to do so at the national level in 2014. In consequence, some multinationals have reduce portion sizes, decrease the amount of caloric sweeteners, or replace the amount of sugar with an equivalent amount of artificial sweetener, the latter having a sweeter taste but fewer calories.

The decline in sugar consumption of developed countries is foreseen to be strongest in Canada, the European Union, and the United Kingdom. In the United States, consumption of sweeteners is expected to remain stable but the share of sugar in per capita caloric sweetener consumption is projected to increase, from 62% during the last decade to 64.5% by 2029. The idea that HFCS is potentially more harmful to health than sugar continues to be debated. In the Russian Federation, sugar demand is anticipated to grow, based on domestically produced confectionary products and homemade alcohol. The debate on a possible taxation of sugar is still in progress, but sugar is expected to remain a cheap source of calories and consumer habits are not expected to change.

Owing to its competitiveness in caloric sugary soft drinks, HFCS consumption (dry weight) is projected to grow by 14% or 1.9 Mt by 2029. Global consumption will remain limited to a few countries (Figure 5.6). Like sugar, per capita consumption is assumed to decline in countries where total caloric sugar consumption is high. China, one of the countries where sweetener consumption is low, is expected to be the main driver of the increase. Because it is the biggest world producer of starch, it is anticipated that China will increase its HFCS supply to fulfil a growing domestic demand, although a lack of profitability is likely to dampen supply growth. In the European Union, growth in consumption will not be as high as anticipated as a result of a stronger than expected competition with sugar. In Mexico, the share of HFCS in the demand for sweeteners is expected to slightly increase over the outlook period because, in response to the country's sugar tax, companies tend to replace sugar by "less sugar" in their soft drinks, even if both products are subject to a tax. Conversely, in the United States, the leading HFCS producer, demand for HFCS as a share of global consumption is projected to continue its decline from 46% during the base period to 37% in 2029. However, the country is projected to consolidate further its position as leader producer over the next decade, to meet the demand in Canada and Mexico.

Figure 5.6. Share of per capita HFCS in sweetener consumption for major consuming countries



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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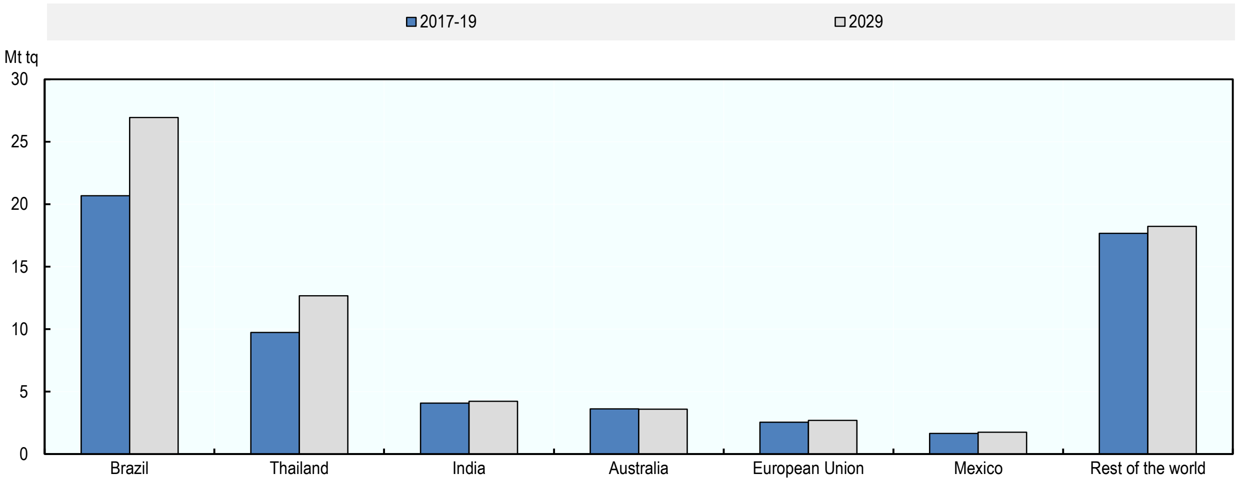
5.6. Trade

Over the coming decade, sugar exports (Figure 5.7) are projected to remain highly concentrated, with Brazil consolidating its position as the leading exporter (from 35% of world trade in the base period to 38% by 2029). The weakening of its currency *vis-à-vis* the US dollar over the projection period will attract investments and improve the industry's competitiveness. However, the sugar market in Brazil will continue to compete with strong ethanol production. Its sugar exports are projected to expand by 6.3 Mt compared to the base period.

In Thailand, the world's second largest sugar exporter, very little ethanol is produced directly from sugarcane (less than 2%); molasses or cassava are used instead. This established Asian sugar producer is expected to progressively recuperate from the current dip in its production to gain international market shares towards the end of the projection period, accounting for 18% of world sugar exports by 2029 (versus 16% during the base period) and reaching 12.7 Mt of sugar exports by 2029. India is projected to have enough supplies and policy support to maintain the level of its exports at about 4 Mt per year throughout the next decade. In Australia, sugarcane will be limited by the availability of irrigated land; in view of this constraint, production levels are projected to remain close to the relatively low levels of the current season, which is nevertheless way above domestic demand. Thus, the country will continue to export around 80% of its production.

In 1968, the European Union introduced sugar and isoglucose production quotas to guarantee production and prices. These quotas were abolished in 2017, which led to a decrease in domestic prices and freed exports from their WTO subsidised export limit. Over the next ten years, even though production is not expected to increase, declining demand will help free high quality white sugar for exports that can be sold at a premium price. These exports will mainly reach sugar-deficit countries in the MENA and Far East regions, although they will face competition from the supply of traditional sugarcane refineries, notably in the MENA region.

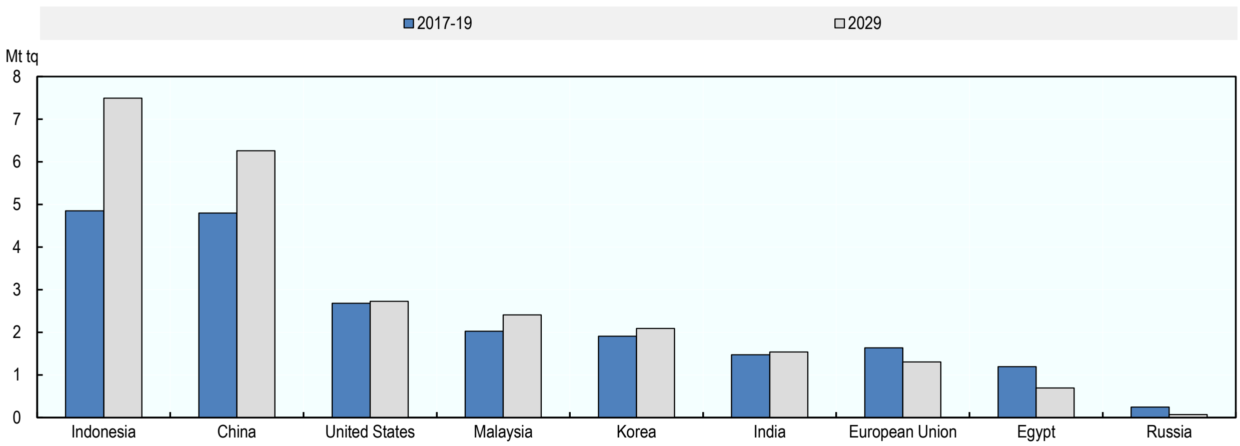
Figure 5.7. Sugar exports for major countries and regions



Note: data are expressed on a tel quel basis (tq).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
StatLink https://doi.org/10.1787/888934142425

World sugar imports are less concentrated than exports (Figure 5.8). Based on the outlook projections, Asia and Africa will see the strongest growth in sugar demand, which in turn will influence the ranking of main importers. During the base period, Indonesia and China were the leading importers (at 4.8 Mt each) followed by the United States (2.7 Mt), Malaysia (2.0 Mt), Korea (1.9 Mt), the European Union (1.6 Mt) and India (1.5 Mt). Over the next decade, Indonesia, with a strong growth in consumption, is projected to consolidate its position as the leading sugar importer (7.5 Mt), followed by China (6.3 Mt), the United States (2.7 Mt), Malaysia (2.4 Mt), Korea (2.1 Mt) and India (1.5 Mt). Due to the abolition of sugar quotas, the European Union has become less an attractive export destination for countries with preferential trade agreements; European Union sugar imports are projected to decrease further to 1.3 Mt by 2029. The EU HFCS trade will not experience significant changes, as production is expected to mostly satisfy internal demand.

Figure 5.8. Sugar imports for major countries and regions



Note: Data are expressed on a tel quel basis (tq).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
StatLink https://doi.org/10.1787/888934142444

In the United States, traditionally a sugar-deficit country, policies will continue to foster domestic production and keep a lid on imports. Tariff rate quota (TRQ) allocations under WTO or free trade agreements (FTAs), as well as limited imports from Mexico due to the US Export Limit (set by the US Department of Commerce) will govern import flows. Given the relatively higher sugar prices in the United States, Mexico will continue to export its sugar primarily to fulfil the United States needs. Mexico, in turn, is expected to resort to US HFCS (+2% or 250 kt by 2029) to meet national demand for sweeteners.

Imports are expected to decline in Egypt and in the Russian Federation. In Egypt, large investment projects are boosting production and imports are anticipated to decrease. In the Russian Federation, the policy of self-sufficiency has been successful and practically no imports should occur over the next ten years.

5.7. Main issues and uncertainties

The projections presented in this *Outlook* assume stable macro-economic and normal weather conditions and make specific assumptions with respect to different variables such as crude oil prices, related policies (i.e. ethanol mandates) or consumption and production trends. A shock to any of these variables can result in significant deviations from the projections, especially since production and trade are concentrated within a small number of countries.

The impact of the COVID-19 pandemic cannot be assessed comprehensively at this stage. However, there are several channels of transmission to the supply and demand sides of the sugar market. For example, confinement measures have curtailed out-of-home demand for sugar. It is too early to assess whether this will have any long-term impact on sugar intake. Aside from specific effects on sugar, the impact of the pandemic on the macro-economic variables, as well as on the crude oil price projections, is likely to alter assumed values used for the preparation of the *Outlook*, particularly in the base year (October 2019-September 2020).

The projections for Brazil carry several uncertainties, particularly with respect to the ongoing financial consolidation. This *Outlook* is also based on assumed levels of the Brazilian real exchange rate, with respect to the US dollar. An appreciation or depreciation of the Real directly affects the competitiveness of the sector and has a significant impact on international and domestic markets. In addition, the implementation of the biofuel program (Renovabio) will also have a significant impact on sugar markets, as Brazil has the flexibility to easily switch between the use of its sugarcane for either sugar or ethanol, depending on relative profitability.

The *Outlook* results for Thailand include substantial uncertainty. The current season has been challenging for the sector with large losses for mills and farmers, so that it is not clear how fast the sector will recuperate. However, the country has benefited from strong investments over the last years, the recent rains will probably improve the yields of the 2020/21 season, and the government is providing policy support to reduce risks in this sector. Furthermore, Thailand is assumed to allocate only a small share of its sugarcane to ethanol production. If the country adopts a different strategy, this could impact the world sugar market significantly given the country's large contribution to the sugar trade.

The outlook for India is susceptible to substantial uncertainties. Small changes in consumption or production trends, or in related policies could have large impacts on world markets as India is the world largest consumer and second largest producer. For example, changes on the assumed fulfilment of the country’s ambitious ethanol blending targets would result in substantial impacts on sugar supply to the domestic and international markets. In addition, production and exports have historically presented large swings which can easily affect market predictions in this *Outlook*.

Trade distortions on international sugar markets will persist. Changes in international sugar prices are not fully transferred to domestic sugar producers and consumers, even if some world sugar markets have undertaken reforms and structural changes (e.g. elimination of sugar quotas in European Union and

Thailand). To protect their domestic markets, many countries continue to use trade policy instruments. These include: (i) high out-of-quota tariffs in China; (ii) the South African dollar-based reference price mechanism that ensures a minimum import price; (iii) adjustments to WTO TRQ and export limit for Mexico (United States); (iv) transportation subsidies to stimulate exports of sugar and support domestic sugar prices (Pakistan, India); (v) high import tariffs (European Union, Russian Federation, United States); and (vi) regional trade agreements (NAFTA, European Economic Partnership Agreements and Everything but Arms).

In view of the growing evidence of the negative impact of excessive sugar consumption on human health, prospects for demand are also uncertain. Some governments have already imposed taxes on caloric sweeteners to encourage lower consumption and this could be reinforced over the next decade, although pro-active actions taken by the food industry – such as product reformulation, use of alternative sweeteners, and decreasing portion sizes – could temper the impact of such policies.

Note

[1] The COVID-19 pandemic is having a significant negative impact on the current sugar season and outlook. However, the final impact of this pandemic on sugar markets is uncertain and has not been included in the data presented here.

6. Meat

This chapter describes the market situation and highlights the medium-term projections for world meat markets for the period 2020-29. Price, production, consumption and trade developments for beef and veal, pigmeat, poultry, and sheepmeat are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world meat markets during the coming ten years.

6.1. Market situation

World meat production decreased to 325 Mt in 2019, primarily due to the impact of African Swine Fever (ASF) in the People's Republic of China (hereafter "China"). The ASF outbreak also spread into a number of African, Central European, some East Asian countries – Democratic People's Republic of Korea, Korea and Mongolia, and to some South-East Asian countries – Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar, The Philippines, Timor-Leste, and Viet Nam. China's overall meat output is estimated to have fallen by 10% in 2019, reflecting a contraction of at least 21% in pigmeat production, which was partially offset by higher production volumes of other meats. However, increased meat production in Argentina, the European Union, Turkey, and the United States resulted in limiting the global decline of meat output to slightly less than 2% for 2019.

In countries where meat output continues to rise, productivity gains are the main factor. In the United States, for example, increased carcass weights have sustained growth. In the European Union, total meat output is also expected to expand despite a decline in bovine meat production. EU production gains are projected for all other categories of meat, especially pigmeat, reflecting robust import demand from China. In Argentina, meat production rose primarily to meet increased foreign demand.

Measured by the FAO Meat Price Index, average prices in 2019 were 5.6% higher than in 2018, with pigmeat, in particular frozen pigmeat, recording the sharpest rise due to China's surge in import demand. Poultry and bovine meat prices also strengthened due to stronger Asian demand, while limited supplies from Oceania supported the continued strength of sheepmeat prices.

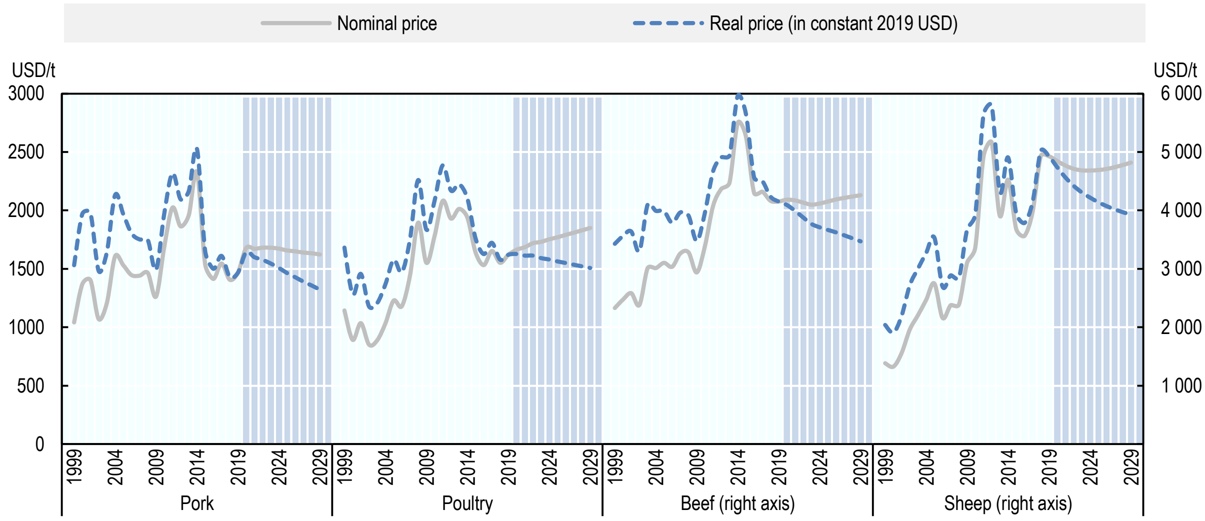
Global meat exports increased to 36 Mt in 2019, up 4% from 2018. The bulk of this increase is attributed to increased imports by China due to ASF-related production losses. China's overall meat imports increased by 62% (around 2 Mt) across all meat categories in 2019. On the export side, much of the expansion in global volumes came from Argentina, Canada, the European Union, Thailand, and the United States.

6.2. Projection highlights

Nominal meat prices are expected to remain, similar to or increase above the base period (2017 to 2019 average) level (Figure 6.1). Over the first half of the projection period, prices will be supported by supply constraints in several Asian countries and the consequent increased import demand. This is relevant for the pigmeat sector, where ASF-related culling has decreased production in Asia. Higher prices will improve profitability in meat production during the first half of the projection period, despite a gradual increase in feed costs (Figure 6.2). When pigmeat supplies begin to return to their long-term trend growth, pigmeat prices will decline in real terms over the remainder of the projection period as productivity growth is assumed to continue. While ongoing economic and population growth in developing countries are the main drivers of meat consumption globally, the *Outlook* projects a levelling-off in per capita meat consumption with a shift towards a demand for quality products in high-income countries.

The real prices (in 2019 USD) for beef and sheepmeat are projected to decrease the most by 2029, to USD 3 472/t and USD 3 926/t carcass weight equivalent (c.w.e.), respectively. In real terms, pigmeat and poultry prices are projected to decline to USD 1 323/t c.w.e. and USD 1 508/t product weight (p.w.), respectively. In nominal terms, all meat prices will increase modestly by 2029 (Figure 6.1). Sheepmeat prices are projected to remain high during the outlook period due to a combination of strong import demand from Asia and supply constraints in Oceania arising from a mixture of drought-induced flock reductions in Australia and a steady decrease in ewe breeding in New Zealand.

Figure 6.1. World meat prices



Note: US Barrows and gilts, National base 51-52% lean c.w.e. Brazil: Export unit value for chicken (f.o.b.) product weight. US Choice steers, 5-area Direct c.w.e., Total all grades. New Zealand lamb price c.w.e., all grade average.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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At the global level, this year's *Outlook* projects that meat production and consumption levels will reach a low point in 2020 as a consequence of the multiple outbreaks of AFS across Asia. In the early years of the outlook period, the overall growth in global meat output will be impacted negatively by a decline in availability of pigmeat, only partially offset by higher production volumes of other meat types.

Growth in consumption of meat over the next decade is projected to increase by 12% by 2029 when compared to the base period. However, over the medium term, growth rates will decrease in response to slower income growth in several regions, ageing populations, and a levelling off in per capita meat consumption in high-income countries as a result of saturation and dietary preferences for higher quality meats. In light of these factors, global consumption per capita is projected to increase to only 34.9 kg retail weight equivalent (r.w.e.) by 2029, an increase of 0.5 kg r.w.e., slightly more than 1%, compared to the base period. Virtually all of this increase per capita is attributed to higher consumption of poultry meat.

The global expansion in meat supply is expected to increase by 40 Mt c.w.e. by 2029, when compared to the base period. Over the course of the outlook period, a combination of herd and flock expansion in the Americas and the European Union regions as well as increased productivity will support a supply-driven market. Developing countries are projected to account for most of the total increase in production, poultry meat remains the primary driver of growth in total meat production. Pigmeat output will remain subdued in the first five years of the outlook period due to the ASF outbreaks, in China and Viet Nam in particular.

The share of traded meat at the global level is expected to increase at the start of the outlook period to supply the Chinese market. For the medium term, the share of traded meat is projected to increase to meet the growing demand from low-income countries, particularly in the least developed countries (LDCs) in Africa, Asia and the Middle East, where national production will remain insufficient to meet demand. The recent ratification by 28 countries (as of December 2019) of the African Continental Free Trade Agreement is also expected to encourage more trade within Africa once the Agreement enters into force in July 2020.

Animal disease outbreaks, sanitary restrictions, and trade policies will remain the main factors that drive the evolution and dynamics in world meat markets. Uncertainties related to existing or future trade agreements over the outlook period (e.g. the United Kingdom's exit from the European Union) could change meat trade patterns. In the short term, the magnitude and duration of the impact of the current outbreak of COVID-19 is uncertain but meat production (including both slaughtering and processing) and consumption patterns, especially those of food services, are expected to be affected. Other factors that could influence the meat outlook over the medium term include changing consumer preferences and attitudes towards meat consumption in view of its impact on health, the environment, animal welfare, and global greenhouse gas (GHG) emissions which may lead to more modest demand growth.

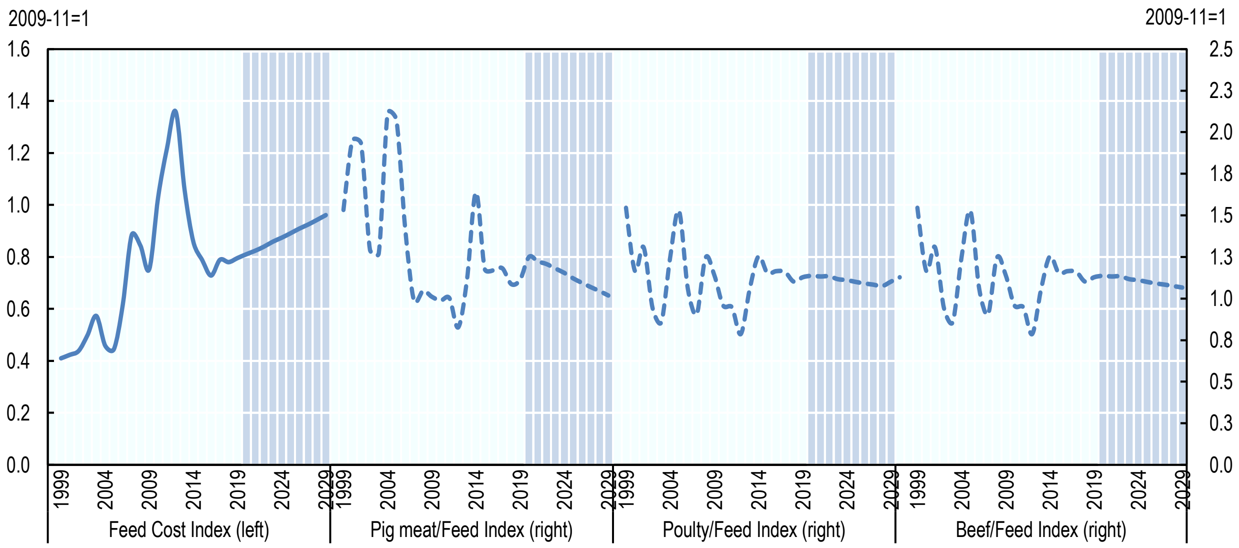
6.3. Prices

Meat prices will remain high in nominal terms over the outlook period (Figure 6.2). Real meat prices are projected to continue to trend downwards due to slower growth in meat consumption, combined with an expanding supply supported by low increase in feed grain prices. The actual path over time will differ by meat type. In the short term, real beef prices will decline faster due to ample beef supply from major producing countries such as Argentina, Brazil, and the United States following a rapid increase in herd inventories in recent years. However, as beef cowherds decline and the rate of production growth slows, nominal prices are projected to start to increase slowly.

Pigmeat prices are projected to decrease in real terms, but remain high in nominal terms, when compared to the base period. Notable features of the global sector that will shape this trend are increased supply from Brazil, the European Union, and the United States, and robust import demand from China in particular. At the global level, a continued increase in poultry flock is expected. The combination of a rise in feed costs and growing import demand will support an increase in nominal poultry prices over the projection period.

Sheepmeat prices in real terms are projected to remain high as contractions in flock will reduce supply and restrict trade from the two leading exporters, Australia and New Zealand. This will maintain pressure on global prices in the early years of the projection period. Strong growth in import demand from China is expected to marginally increase in the second part of the projection period as the effects of ASF begin to subside.

Figure 6.2. Feed cost index and meat to feed nominal price ratios



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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6.4. Production

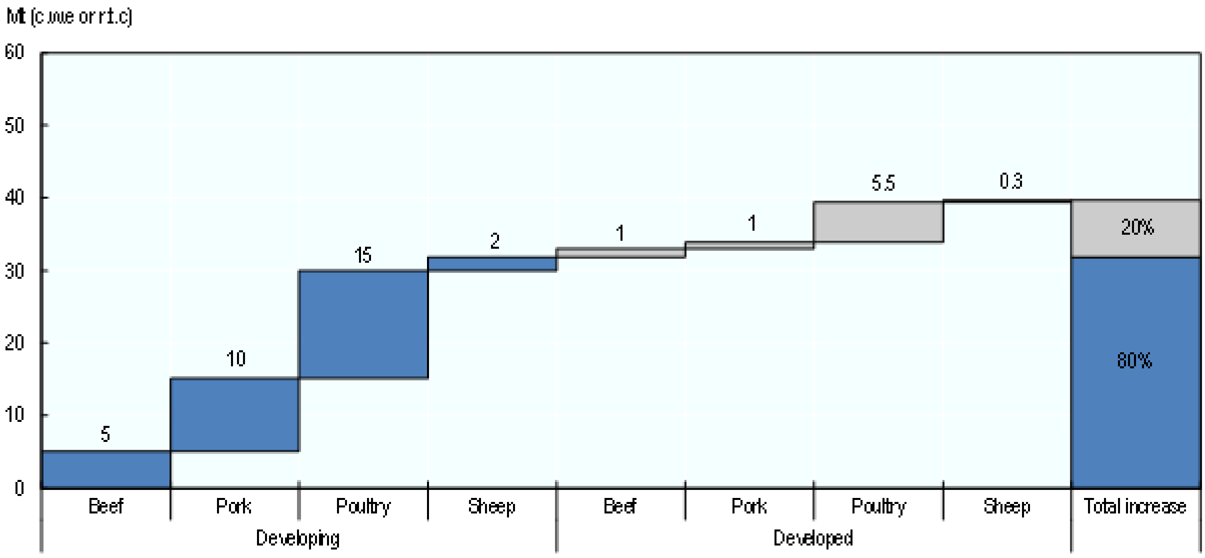
Over the medium term, production will benefit from favourable meat-to-feed price ratios (Figure 6.3). Increased import demand will support meat prices, contributing to higher profitability in meat production during the first half of the projection period. This is particularly relevant in the pigmeat sector, where ASF-related culling has decreased production in East Asia. Inherent differences in the production system imply that favourable meat-to-feed ratios are more beneficial to poultry and pigmeat production, whereas beef producers have more flexibility in the intensity of feed use. Sheepmeat production is mostly pasture-based and producers benefit less from lower meat-to-feed price ratios.

Over the course of the outlook period, a combination of herd and flock expansion in the Americas and increased productivity in the region will support a supply-driven market. Poultry meat remains the primary driver of growth in total meat production. Low production costs, a short production cycle, high feed conversion ratios, and low product prices have contributed to making poultry the meat of choice for both producers and consumers.

Global meat production is projected to expand by nearly 40 Mt by 2029, reaching 366 Mt. Overall, the bulk of meat production growth is attributed to developing regions, which will account for 80% of the additional output (Figure 6.3). In the short term, the supply response of the various meat types remains influenced by ASF outbreaks in Asia, as well as reductions of beef cattle numbers and sheep flock in Australia due to weather conditions. Post-2021, these factors will stabilise and a gradual recovery in the production of meat is expected to follow.

Figure 6.3. Growth of meat production by region and meat type

2029 vs 2017-19



Note: c.w.e. is carcass weight equivalent, r.t.c. is ready to cook equivalent.
Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Brazil, China, the European Union, and the United States are projected to produce nearly 60% of global meat output by 2029. Production growth in Brazil will continue to benefit from an abundant supply of natural resources, feed, grassland availability, productivity gains and, to some extent, the devaluation of the Real. Production in China will benefit from growing economies of scale as small production units grow into larger commercial enterprises. Production in the United States will benefit from strong domestic demand and higher slaughter weights in a low feed cost environment. The overall meat production in the European Union will remain stable reflecting a small reduction in domestic demand for both beef and pigmeat, while in African countries the ratification of the African Continental Free Trade Agreement, under which more than 90% of products traded within Africa will be duty free, is expected to promote additional meat production.

Global beef production will grow over the outlook period, particularly in the main producing countries of the Americas such as Argentina, Brazil and the United States. Developing countries are projected to account for 81% of the additional beef produced by 2029, when compared to the base period. The majority of this expansion should occur in Argentina (despite the export tax on beef), Brazil, China, Pakistan, Sub-Saharan Africa, and Turkey. In developed countries, production is projected to be 4% higher by 2029 compared to the base period; this increase will be mainly due to high growth in Canada and the United States. Beef production in North America will be supported by both higher carcass weights, resulting from low feed costs, as well as increased slaughter numbers as herd rebuilding lead to higher livestock numbers.

Beef supply will remain tight in Australia over the short term as a result of the drought conditions that have prevailed over the past few years. A gradual recovery in production is expected to follow, however, the herd rebuilding is expected to take some years. In the European Union and the United Kingdom, a downward trend in beef production is expected as dairy cowherds, which make up approximately two-thirds of the beef supply, will decrease following productivity gains in the milk sector. Other factors limiting the growth potential of this sector in the European Union are a reduction in suckler cowherds due to their low profitability, escalating competition in export markets, and declining domestic demand. Furthermore, it is projected that demand will shift as consumer taste changes to include more processed meat and ready-to-eat meals.

The ASF outbreak across Asia, which has substantially shifted supply and demand since late 2018, continues to affect many countries, with China and Viet Nam suffering the greatest impact. It is projected that ASF outbreaks will continue to reduce global pigmeat output until 2021, after which it is expected to steadily increase over the remainder of the outlook period. This *Outlook* assumes that Chinese pigmeat production will decline in 2020 by 8%. Production and consumption in China is projected to reach 2017 levels in 2025/2026 and to resume a steady growth trend for the remainder of the outlook period. The increase in global pork production over the next decade will be largely driven by recovery from ASF in the Asian region, with China's production growth aimed at supplying its own domestic market. This growth is expected to provide two-thirds of the additional global output. High production growth rates are also expected in Viet Nam over the outlook period. Pigmeat production in the European Union is projected to decrease slightly as environmental and public concerns are expected to limit its expansion.

Poultry meat will continue to be the primary driver of meat production growth, albeit at a slower rate in the projection period relative to the past decade, accounting for half of all additional meat produced over the next decade. Its short production cycle allows producers to respond quickly to market signals, while also allowing for rapid improvements in genetics, animal health, and feeding practices. Production will expand rapidly from sustained productivity gains in China, Brazil, and the United States, and investments made in the European Union – in particular, Hungary, Poland and Romania which will take advantage of the lower production costs. Rapid expansion is also foreseen in Asia as the shift away from pigmeat consumption in the short term will benefit poultry in the medium term.

Growth in sheepmeat production will mostly originate in Asia, led by China, but significant increases in production are projected to occur in Africa, particularly in the least developed countries of Sub-Saharan Africa. Despite limitations linked to urbanisation, desertification, and the availability of feed in some countries, sheep and goats in particular represent a popular stock well adapted to the region and the extensive production systems it utilises. In Oceania, production growth is expected to increase only moderately because of ongoing competition for pastureland from beef and dairy in New Zealand, which is the major exporter, as well as the extreme and prolonged drought in Australia where total sheep numbers have fallen from 72 to 66 million from 2017 to 2019. Sheepmeat production in the European Union is expected to remain stable, as it will be sustained by the voluntary coupled support in the main sheep-producing Member States.

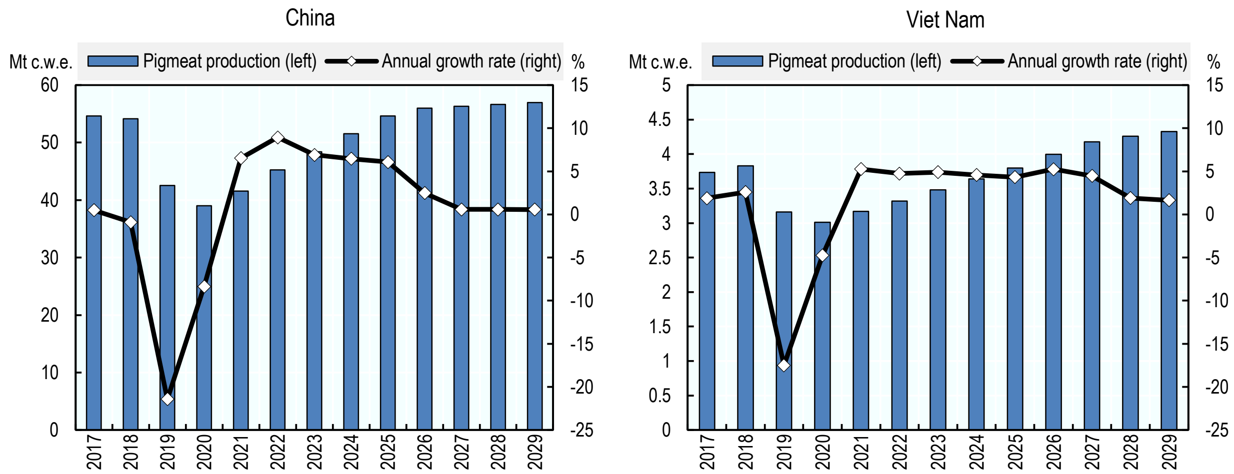
This *Outlook* provides projections for agricultural markets that incorporate assumptions of the effects of the ASF outbreak in China. These assumptions include the 2019 government support plan over the next three years and which includes a series of policies designed to stabilise, recover and stimulate pig production. Increased financial support for the development of larger production facilities as well as increased scientific research to develop a vaccine and technical services and guidelines to prevent and control ASF are being implemented. It is expected this will result in the disappearance of many smaller farms, which will receive subsidies for culling herd to the benefit of increasingly large integrated producers, which generally have stronger biosecurity measures.[1] In 2019, China's pigmeat production decreased by 21%, and is projected to decline a further 8% in 2020. Starting from 2021, this *Outlook* assumes pigmeat production will increase and reach pre-ASF production levels by 2025. This reflects the projections presented by Ministry of Agriculture and Rural Affairs in the *China Agricultural Outlook* (2019-2028) that are adjusted to account for 2019 market developments (Figure°6.4). Import volumes also increased in 2019 and are projected to reach 3 Mt by 2020, an increase of 24% over 2019. This should increase China's share of world imports from 17% in 2017 to about 29% in 2020. Most of China's pigmeat imports are expected to originate from Brazil, Canada, the European Union, and the United States. In addition, China is expected to significantly increase its import of live sow to rebuild its inventory.

The effect of the current ASF outbreak has also been severe in Viet Nam, where the sector is dominated by small producers. Since confirming the first outbreak in February 2019, ASF has spread rapidly to all provinces. By March 2020, it was estimated that approximately 6 million pigs had been culled. Recent signs of improvement are nonetheless evident with 35 of the 63 provinces reporting in early March 2020 no outbreaks within the last 30 days.[2] It is assumed in this *Outlook* that production will remain weak in 2020 before starting a gradual recovery to reach 2018 levels by 2025 (Figure 6.4). Several other East Asian countries have been affected to a lesser extent by ASF outbreaks; its impact in these countries is analysed in this *Outlook* as of early January 2020.

ASF has led Chinese consumers to turn to alternative sources of meat, in particular poultry. In spite of the recent resurgence of Highly Pathogenic Avian Influenza (HPAI), poultry, and egg production are projected to increase in China so as to supply some of the additional domestic demand for alternative types of meat. However, the sharp reduction in pig numbers still supports the expectation that growth in overall feed demand will change in the early years of the outlook period. In the case of maize, feed demand is projected to decline for the first two years of the projection period when Chinese pigmeat production is expected to be at its lowest. This is primarily because of the greater amount of feed required to produce a given volume of pigmeat (for more information on the interaction between China's ASF affected meat production and feedstock demand, see FAO, 2019[3]).

The recent outbreaks of COVID-19 have also affected the meat market in China. Since the beginning of 2020, the lack of workers in the labour-intensive meat processing industry (abattoirs) and the transportation bottlenecks that have been created have resulted in a shortage of meat at markedly higher prices.[4]

Figure 6.4. Pigmeat production



Note: c.w.e. is carcass weight equivalent.
Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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6.5. Consumption

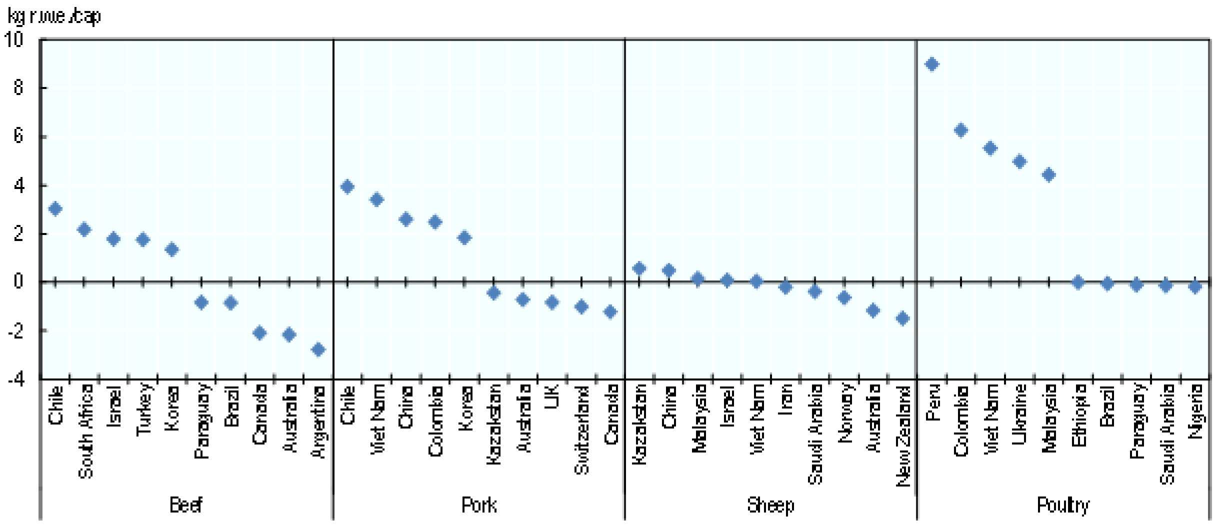
Growth in meat consumption is projected to increase in developing regions due to high population levels and growth rates. It is expected this will result in an overall growth in the volume of meat consumption in developing countries approximately five times that of developed countries. This is particularly relevant in Africa and Asia, where growth rates are expected to be higher over the outlook period when compared to the past decade. The ratification of the African Continental Free Trade Agreement is projected to positively impact on trade flows within the continent due to the additional consumption resulting from lower prices. Gains in per capita consumption are expected to remain small, however, as income growth occurs from a small base. Nevertheless, high population growth implies that total consumption growth will be faster than for any other region, despite limited and sometimes negative gains in per capita terms. Growth in meat consumption in Asia will stem from a combination of increased availability as the ASF outbreak abates, in addition to increased consumption per capita due to rising incomes, declining meat prices in real term, and trade liberalisation.

At the country level, change in per capita meat consumption varies widely among countries and meat types over the projection period (Figure 6.5). Global meat consumption per capita is projected to increase slightly by 0.4 kg r.w.e. compared to the base period. Consumption levels in the higher income regions are, in some cases, close to saturation. This *Outlook* projects that annual growth in per capita meat consumption in developed countries will be 0.24% p.a., one-fourth of the annual growth rate of the preceding decade, but 0.8% p.a. in developing countries, double that of the preceding decade.

How consumers spend their money on food is also changing. In high-income countries, increases in food expenditure per individual are shifting from the purchase of fresh food prepared in one’s home towards convenience food and eating-out.[5] [6]This is the case, for example, in Japan, in particular amongst older and single person households, and it is a trend that the Japanese government expects will increase over the next decade. In addition, given that the Japanese population is expected to decline by 4%, when compared to the base period, overall meat consumption is projected to decrease marginally. Other factors, such as quality, will become increasingly important for consumers in high-income countries and influence their choices.

Figure 6.5. Top 5 countries increase/decrease in per capita consumption by different meat types

2029 vs. average 2017-19



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Meat demand continues to increase as income continues to grow in developing countries, where per capita consumption is projected to increase further and per capita growth rates to be equivalent to those in developed countries, when compared to the base period. In developed countries, changes in meat consumption reflect a decline in the influence of factors such as income and price, and, as noted above, many of these countries have reached saturation in their meat consumption levels (Figure 6.6). Other factors include religious beliefs, cultural norms, urbanisation, and environmental, ethical, and health concerns.

Historically, lower prices have contributed to making poultry the meat of choice for consumers in developing countries. With slow growth in income over the projection period, this will continue to be the case and poultry will constitute the largest share of additional per capita consumption at the global level.

Beef consumption is projected to increase to 76 Mt over the next ten years and to account for 16% of the total increase in meat consumption compared to the base period. In per capita terms, beef consumption in the developing world is expected to continue to remain lower, at about one-third in volume terms, relative to developed countries. Asia is the only region where it is projected to increase its per capita beef consumption over the projection period, albeit from a low base. Several countries that have high beef per capita consumption will see their level of beef consumption decline in favour of cheaper pigmeat and poultry meat.

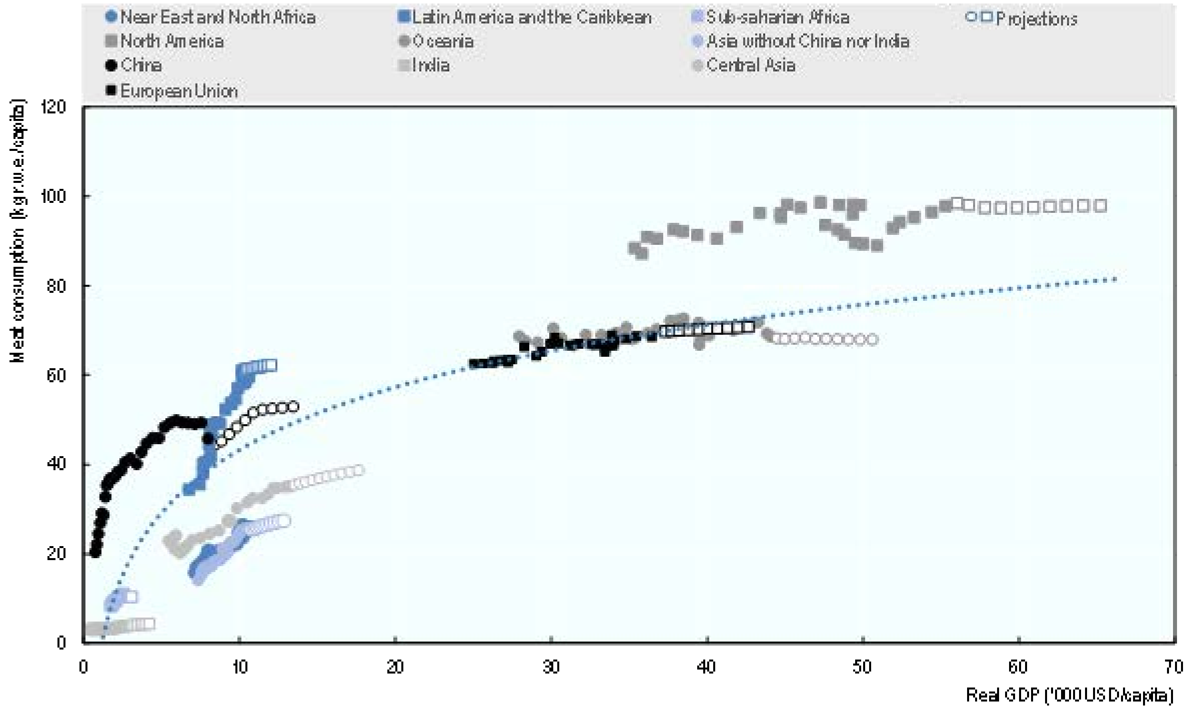
Global pigmeat consumption is projected to increase to 127 Mt over the next ten years and to account for 28% of the total increase in meat consumption. On a per capita basis, pigmeat consumption is expected to marginally decline over the outlook period as consumption declines in most of the developed countries. In the European Union, for example, it is projected to decline as changes in the composition of the population influences diets that will favour poultry to pigmeat; the former is not only cheaper but also perceived as a healthier food choice. In developing countries, per capita consumption of pigmeat, which is half of that in developed countries, is expected to marginally increase over the projection period. Growth rates are sustained in most of Latin America, where per capita pigmeat consumption has grown rapidly, backed by favourable relative prices that have positioned pork as one of the favoured meats, along with poultry, to meet rising demand from the middle class. Several Asian countries, which traditionally consume pork, are projected to increase consumption on a per capita basis once the impact of ASF wanes.

Consumption of poultry meat is projected to increase globally to 145 Mt over the projection period, with poultry expected to account for 50% of the additional meat consumed. On a per capita basis, the expected robust growth rates in poultry consumption reflect the significant role it plays in the national diets of several populous developing countries, including China and India. Nevertheless, a substantial gap, mainly linked to income levels, will remain with the developed countries, which consume nearly three times as much poultry as developing countries.

Global sheepmeat consumption, a niche market in some countries and considered a premium component of diets in many other countries, is projected to increase by 2 Mt over the outlook period and account for 6% of the additional meat consumed. Sheepmeat consumption worldwide, on a per capita basis, is comparable in both developing and developed countries, and is expected to increase marginally over the projection period as prices are expected to remain high. In many Middle Eastern and North African (MENA) countries, where sheepmeat is traditionally consumed, per capita consumption is projected to continue its long term decline at the benefit of poultry. Demand growth in this region is tightly linked to the oil market, which influences substantially both the disposable income of the middle class and government spending patterns.

Figure 6.6. Income impact on per capita meat consumption per region

1990 to 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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6.6. Trade

Global meat traded (excluding live animals and processed products) are projected to be nearly 12% higher in 2029 than in the base period. This represents a slow-down in the growth of meat trade to an annual average rate of nearly 0.6%, compared to 3% during the previous decade. It is expected, however, that the share of total meat output traded will increase slightly over time, in particular at the beginning of the projection period.

Meat exports are concentrated, and the combined share of the three largest meat exporting countries – Brazil, the European Union and the United States – is projected to be nearly 60% of world meat exports by 2029. In Latin America, traditional exporting countries are expected to retain a high share of the global meat trade, benefiting from the depreciation of their currencies and surplus feed grain production.

Rising imports over the next decade will be comprised mainly of poultry, the largest contributor, and beef. Together, these two meat types are projected to account for most of the additional meat imports into Asia and Africa where consumption growth will outpace the expansion of domestic production.

Import demand is expected to increase the fastest (in terms of growth rates) in Sub Saharan Africa, while in volume terms the increase in meat imports is driven by Asia. The Asian region will account for 53% of global trade by 2029. The greatest increases will originate from the Philippines, and Viet Nam, for poultry meat. While Chinese meat imports will increase substantially in the early part of the projection period, a gradual decline in imports is projected in the second half of the projection period as production recovers from the ASF outbreak (Figure 6.4). The increased import demand for pigmeat in China is expected to yield high benefits for Brazil, Canada, the European Union, and the United States. In the Russian Federation, the long-term effects of the 2014 import ban on meat, which this *Outlook* expects to remain in effect until the end of 2020, has stimulated domestic production, and meat import levels are expected to continue to decline over the projection period.

Sheepmeat exports from Australia and New Zealand have benefitted from the weak NZD and AUD relative to the US dollar, as well as from strong demand at the global level. Shipments to China are projected to remain high as significant growth in Chinese demand for sheepmeat is expected for the duration of the ASF outbreak. This demand contrasts with decreased demand from the United Kingdom and continental Europe in the first half of the outlook period. As a result, Australia is expected to continue to increase its lamb production at the expense of mutton. In New Zealand, export growth is projected to be marginal, as land use has shifted from sheep farming to dairy.

6.7. Main issues and uncertainties

Trade policies remain a major factor affecting the dynamics of world meat markets. The implementation of various trade agreements over the outlook period could diversify or consolidate meat trade considerably. Unilateral and/or unexpected trade policy decisions are another risk factor in the projections. Domestic policies also influence the competitiveness of meat producers. Argentina introduced a temporary meat export tax in 2018, which is expected to negatively affect the country's competitiveness on the world meat market. Ongoing trade negotiations between the United Kingdom and the European Union will also influence the various meat markets.

Animal diseases have disrupted poultry, beef and, pigmeat markets and this is likely to continue over the outlook period. The medium-term impact of ASF on global pork production is uncertain, but measures to contain this outbreak are assumed in this *Outlook* to depress global pork production in the next five years. The medium-term impact of ASF, however, may be more or less severe than currently anticipated.

In the short term, the magnitude of the impact and the duration of the COVID-19 outbreak are uncertain. Labour supply and transportation problems could hinder the marketing chain and affect meat production (including both slaughtering and processing). This outbreak will also impact, in the short term, consumption patterns, in particular out-of-home consumption which in turn will impact demand for high value meat cuts usually consumed in restaurants. In addition, the threat of market-ready livestock that cannot be traded or processed given the current labour shortage could result in severe economic fallout in rural communities and a major animal welfare challenge. Finally, the duration of the economic slowdown and its impact on income growth is likely to dampen meat demand, which has a high income responsiveness, for part of the projection period.

Aggregate consumption of meat has been on a continuous upward trajectory, driven by population and income increases. However, the pattern for individual meat types has not been homogenous. Differences in relative prices, combined with growing health and environmental concerns have led consumers to gradually decrease the share of red meat in their meat consumption, while increasing the share of poultry. There is evidence that growth rates in meat consumption are declining in response to slowing income growth rates. Many high income countries are reaching saturation levels in terms of per capita consumption (Figure 6.6). Changing consumer preferences – such as the rise in vegetarian or vegan lifestyles, societal concerns such as the negative impact of meat production on the environment, and other various socio-cultural aspects such as those dictated by religion or cultural norms – will also have an effect.

Climate change, obesity, technology advancements and changing consumer lifestyles are also important factors, in particular as they influence policy initiatives and shifts towards environmentally sustainable consumption patterns. The increasing attention of consumers to animal treatment and how meat is produced (with a growing preference for organic meat and meat products) are relatively new factors that are difficult to assess at this point in time. If adopted by an increasing share of the population, however, they could affect global meat markets, although the extent to which consumers are willing and able to pay a premium for such goods is unclear. In many developing regions, affordability remains a primary concern.

Notes

[1] OECD (2020), *Agricultural Policy Monitoring and Evaluation 2020*, OECD Publishing, Paris.

[2] http://www.fao.org/ag/againfo/programmes/en/empres/ASF/situation_update.html (as of 15 May 2020)

[3] FAO (2019), “African Swine Fever: Challenges for some, opportunities for others?” in *Food Outlook*, FAO Publications, Rome.

[4] FAO (2020), *COVID-19: Channels of transmission to food and agriculture*, FAO Publications, Rome. http://www.fao.org/documents/card/en/c/ca8430en.

[5] See Chapter 2, “Consumer Trends of EC (2019)”, *EU Agricultural Outlook for Markets and Income, 2019-2030*, European Commission, DG Agriculture and Rural Development, Brussels.

[6] Yagi, K. (2019), “Regarding future estimates of food consumption in Japan, Continuing decreases in total food expenditure and externalization of our diet”, *PRIMAFF Review*, No. 92, pp.2-3.

7. Dairy and dairy products

This chapter describes the market situation and highlights the medium-term projections for world dairy markets for the period 2020-29. Price, production, consumption and trade developments for milk, fresh dairy products, butter, cheese, skimmed milk powder and whole milk powder are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world dairy markets during the coming ten years.

7.1. Market situation

World milk production (81% cow milk, 15% buffalo milk, and 4% for goat, sheep and camel milk combined) grew by 1.3% in 2019 to about 852 Mt. In India, the largest milk producer in the world, production increased by 4.2% to 192 Mt, although this had little impact on the world dairy market as India trades only marginal quantities of milk and dairy products.

Milk production of the three major dairy exporters, New Zealand, European Union and the United States, increased only slightly. As domestic consumption of dairy products in these three countries is stable, the availability of fresh dairy products[1] and processed products for export increased. In the People's Republic of China (hereafter "China"), the world's largest importer of dairy products, milk production increased by 3.6% in 2019. Its dairy imports, especially of whole milk powder (WMP) and of skim milk powder (SMP), nevertheless increased in 2019 due to increasing demand.

International dairy prices refer to dairy products other than unprocessed milk, which is practically not traded. Butter is the reference for milk fat and SMP for other milk solids. Milk fat and other milk solids together account for about 13% of the weight of milk, with the remainder being water. Although the world butter price continued to decline compared to its record 2017 price levels, it remained high in real terms. The strength of milk fat prices (butter) is supported by strong demand in North America and Europe for cream, butter, and other full-fat milk products. SMP prices recovered during 2019 from low levels after the European Union sold its intervention stocks, purchased in 2016 when prices fell below the set threshold of EUR 1 698 per tonne. Consequently, the difference between butter and SMP prices declined.

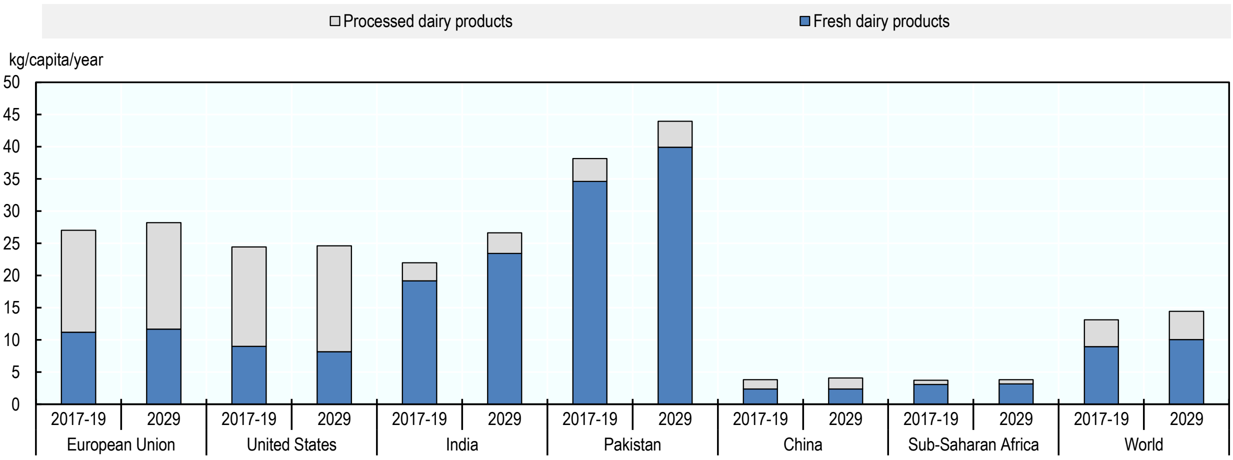
7.2. Projection highlights

World milk production is projected to grow at 1.6% p.a. over the projection period (to 997 Mt by 2029, faster than most other main agricultural commodities). In contrast to the previous decade, the projected growth of cowherds (0.8% p.a.) is slightly higher than the projected average yield growth (0.7%) as cowherds are expected to grow faster in countries with low yields. It is expected that India and Pakistan, important milk producers, will contribute more than half of the growth in world milk production over the next ten years, and will account for more than 30% of world production in 2029. Production in the second largest milk producer, the European Union, is expected to grow more slowly than the world average due to environmental restrictions and limited domestic demand growth.

Milk must be processed shortly after its collection as it cannot be stored for more than a few days. Most dairy production is consumed in the form of fresh dairy products, which are unprocessed or only slightly processed (i.e. pasteurised or fermented). The share of fresh dairy products in world consumption is expected to increase over the coming decade due to strong demand growth in India, Pakistan and Africa, driven by income and population growth. World per capita consumption of fresh dairy products is projected to increase by 1.0% p.a. over the coming decade. In Europe and North America, overall per capita demand for fresh dairy products is stable or even declining, but the composition of demand has been shifting for several years towards dairy fat. In addition, the consumption of plant-based dairy substitutes in the liquid market is expected to grow strongly in East Asia, Europe and North America, albeit from low volumes.

Most cheese consumption, the second most important dairy product consumed in terms of milk solids (after fresh dairy products) occurs in Europe and North America where per capita consumption is expected to continue to increase, especially as ingredient in processed food. The demand for milk powders is partly driven by its use in the food industry, including in regions where animal protein demand is increasing faster than production. In Africa, only a small share of SMP supplies is produced locally and demand for this product is expected to grow fast over the coming ten years. The strongest demand growth for butter is expected in Asia, but this growth is starting from a low consumption base.

Figure 7.1. Per capita consumption of processed and fresh dairy products in milk solids



Note: Milk solids are calculated by adding the amount of fat and non-fat solids for each product; processed dairy products include butter cheese, skim milk powder and whole milk powder.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142577

Milk is traded internationally mainly in the form of processed dairy products. China consumes small amounts of dairy products per capita, but is expected to remain the most important importer of milk products, especially of whole milk powder (WMP). Japan, the Russian Federation, Mexico, the Middle East and North Africa will continue to be important net importers of dairy products. Compared with rest of the world, per capita consumption of dairy products is low in Asia, especially in South-East Asia. However, economic and population growth, and a shift toward higher-value foods and livestock products are expected to continue to drive increasing import demand for dairy products in many Asian countries. International trade agreements (e.g. CPTPP, CETA, and the preferential trade agreement between Japan and the European Union) have specific arrangements for dairy products (e.g. tariff rate quotas) which create opportunities for further trade growth.

Dairy trade flows could be substantially altered by changes in the trade policy environment. For example, large amounts of cheese and other dairy products are traded between the European Union and the United Kingdom, and this trade could be affected by the new trade relationship which still needs to be agreed upon. The United States-Mexico-Canada Agreement (USMCA) is expected to influence dairy trade flows in North America. To date, the big milk consuming countries, India and Pakistan, have not integrated into the international market, but greater engagement in trade by these two countries could have a significant effect on world markets.

Since 2015, the price of butter has been considerably higher than SMP prices. This development is attributed to stronger demand for milk fat compared to other milk solids on the international market and is assumed to remain a defining feature over the coming decade, although the gap is expected to narrow over the projection period.

Environmental concerns and regulations could alter the projections for the dairy sector. In several countries, dairy production accounts for a substantial share of overall greenhouse gas (GHG) emissions, resulting in discussions on how adjustments to dairy production could contribute to reducing such emissions. Many technical adjustments are being considered, with different implications for commodity balances. In regions with high stocking densities, nitrogen and phosphate run-off can create environmental problems. The regulations planned or implemented to address these could have a significant effect on dairy farming, notably in the Netherlands, Denmark and Germany. On the other hand, these pressures could lead to innovative solutions improving long-term competitiveness.

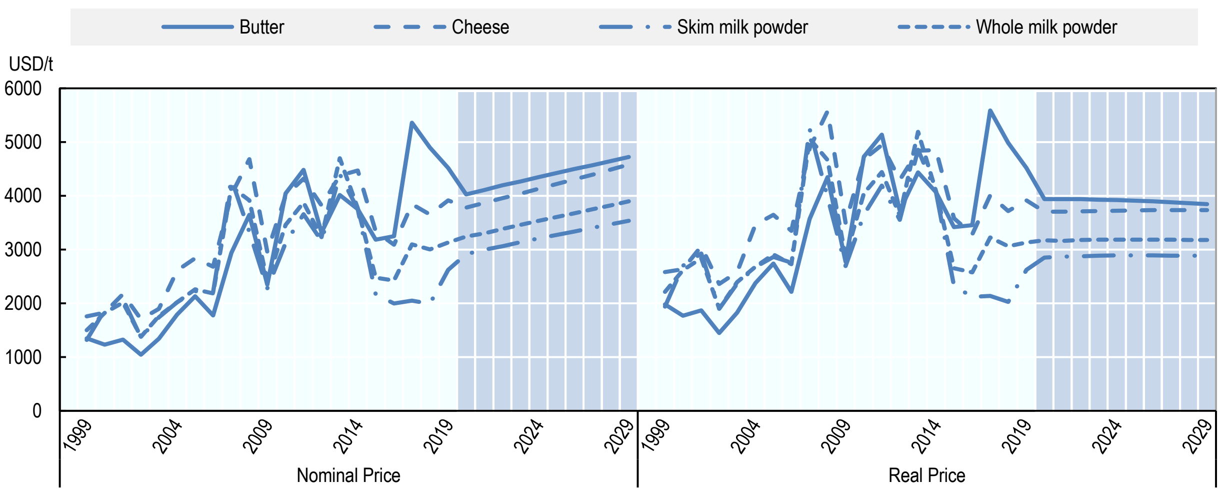
The COVID-19 pandemic will also influence international dairy markets, although the extent remains uncertain. Confinement measures affect away-from-home consumption, which often includes a large share of dairy products, especially cheese. The perishable nature of milk and dairy products requires a smoothly working food chain domestically and internationally, and any disruption could have considerable impact.

7.3. Prices

International reference prices for dairy refer to processed products of the main exporters in Oceania and Europe. The two main reference prices for dairy are for butter and SMP. Since 2015, the price of butter has increased considerably more than SMP prices due largely to stronger demand for milk fat on the international market compared to other milk solids. This is expected to continue over the coming decade, although the gap between butter and SMP prices is expected to narrow compared to the last five years (Figure 7.2).

Following the complete disposal of intervention stocks in the European Union, SMP prices recovered in 2019. Consequently, it is expected that SMP prices will remain stable in real terms throughout the projection period. Annual butter prices peaked historically in 2017 and have been declining since. Butter prices are expected to continue to decline slightly in real terms, in line with most other agricultural commodities over the projection period. World prices for WMP and cheese are expected to be affected by butter and SMP price developments, in line with the respective content of fat and non-fat solids.

Figure 7.2. Dairy product prices



Note: Butter, FOB export price, butter, 82% butterfat, Oceania; Skim Milk Powder, FOB export price, non-fat dry milk, 1.25% butterfat, Oceania; Whole Milk Powder, FOB export price, 26% butterfat, Oceania; Cheese, FOB export price, cheddar cheese, 39% moisture, Oceania. Real prices are nominal world prices deflated by the US GDP deflator (2019=1).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

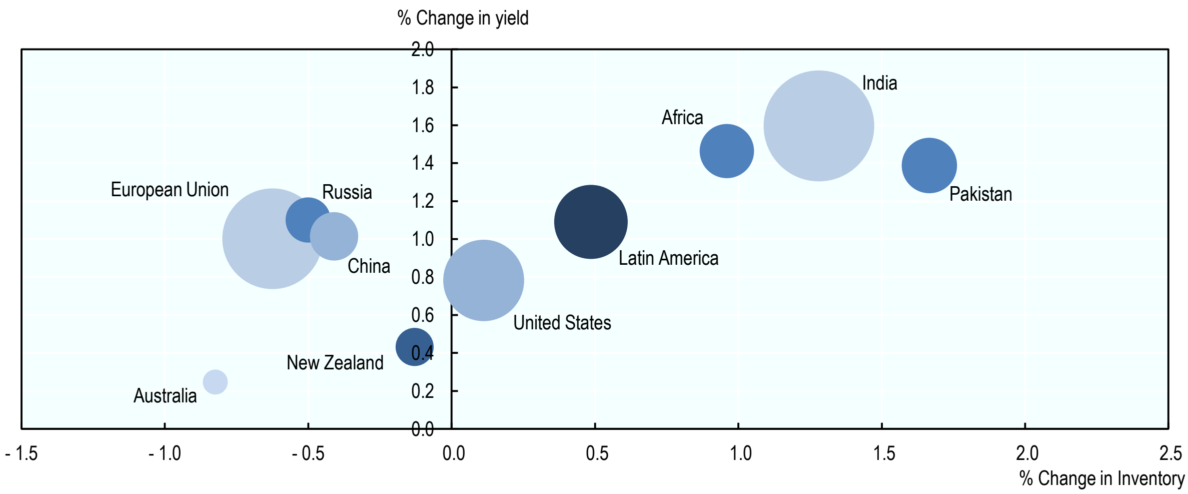
StatLink https://doi.org/10.1787/888934142596

The strong volatility of international dairy prices stems from its small trade share (approximately 8% of world milk production), the dominance of a few exporters and importers, and a restrictive trade policy environment. Most domestic markets are only loosely connected to those prices as fresh dairy products dominate consumption and only a small share of milk is processed as compared to that which is fermented or pasteurised.

7.4. Production

World milk production is projected to grow at 1.6% p.a. (to 997 Mt by 2029) over the next decade, faster than most other main agricultural commodities. While the world average growth of herds (0.8% p.a.) is greater than the world average yield growth (0.7%), the changing averages are the result of herds growing faster in countries that have relatively low yields. In almost all regions of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.3). The drivers of yield growth include the optimisation of milk production systems, improved animal health, improved efficiencies in feeding, as well as better genetics.

Figure 7.3. Annual changes in inventories of dairy herd and yields between 2019 and 2029



Note: The size of the bubbles refer to the total milk production in the base period 2017-19.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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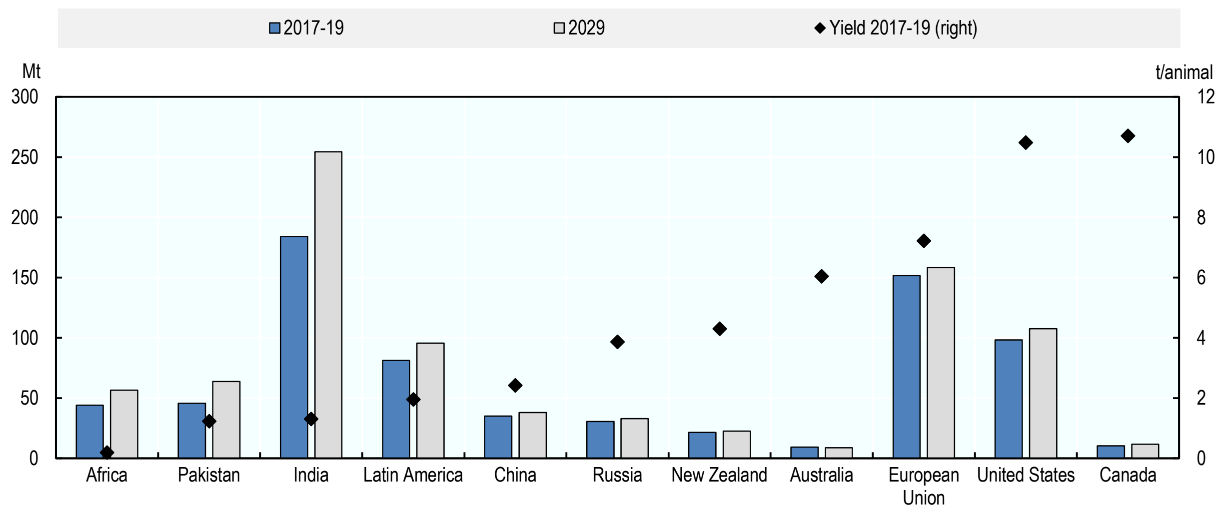
India and Pakistan are expected to contribute to more than half of the growth in world milk production over the next ten years. They are also expected to account for more than 30% of world production in 2029. Production will occur mostly in small herds of a few cows or buffaloes. It is expected that yields will continue to grow fast and contribute more to production growth. Nevertheless, the growing herd sizes and limited growth in pasture area require an intensification of pasture use. In both countries, the vast majority of production will be consumed domestically as few fresh products and dairy products are traded internationally. The link between dairy and beef production is less strong in India where for cultural reasons fewer calves and old dairy cows enter the beef market. Beef production in Pakistan remains primarily a by-product of dairy production.

Production in the European Union, the second largest milk producer, is projected to grow more slowly than the world average. Dairy herds are projected to decline (-0.6% p.a.), but milk yields are projected to grow at 1% p.a. over the next decade. The European Union production originates from a mix of grass- and feed-based production systems. In addition, a growing share of milk produced is expected to be organic. At present, more than 10% of dairy cows are within organic systems located in Austria, Sweden, Latvia, Greece, and Denmark. With about 3% of European Union milk production coming from organic farms that have relatively low yields, there is a considerable price premium on EU milk production. In general, domestic demand (cheese, butter, cream, and other products) is expected to grow only slightly, with most additional production destined for export.

The highest average yield per cow is observed in North America as the share of grass-based production is low and feeding is focused on high yields from specialised dairy herds (Figure 7.4). Dairy cowherds in the United States and Canada are expected to remain largely unchanged and production growth is expected to originate from further yield increases. As domestic demand is projected to remain stronger for milk fats, the United States will mostly export SMP.

Figure 7.4. Milk production and yield in selected countries and regions



Note: The yield is calculated per milking animal (mainly cows but also buffaloes, camels, sheep and goats)
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142634

New Zealand is the most export-orientated producer and has seen very modest growth in milk production in recent years. Milk production is mainly grass-based and yields are considerably lower than in North America and Europe. The efficiency of grass management and year-round grazing, however, allow New Zealand to be competitive. The main constraining factors for growth are land availability and increasing environmental restrictions. A change to a more feed-based production is not expected. As New Zealand has only a small domestic market, milk production growth will be entirely destined for export which faces larger uncertainties, e.g. due to trade measures following the COVID-19 pandemic.

Strong production growth is expected in Africa, mostly due to larger herds. These will usually have low yields, and a considerable share of milk production will come from goats and sheep. Most cows, goats and sheep graze and are used for other purposes as well, such as meat production, traction, and savings. The additional grazing is expected to occur on the same pasture area, leading to a more intensive use which may in turn lead to local over-grazing. Over the projection period, about a third of the worldwide herd population is projected to be located in Africa and to account for about 5% of world milk production.

It is projected that less than 30% of milk will be further processed into products such as butter, cheese, SMP, WMP, or whey powder. There is considerable direct food demand for butter and cheese, especially the latter, and they presently account for a large share of consumption of milk solids in Europe and North America. SMP and WMP are highly traded and largely produced for trade only. Both are used in the food-processing sector, notably in confectionary, infant formula, and bakery products.

Production of butter is projected to grow at 1.6% p.a., of SMP at 1.6% p.a. and of WMP at 1.7%; all at similar growth rate than overall milk production. Only cheese production is projected to grow slower at 1.2% p.a. The slower growth rate for cheese is due to the importance of slow growing food markets in Europe and North America.

7.5. Consumption

Most of the dairy production is consumed in the form of fresh dairy products, including pasteurised and fermented products. The share of fresh dairy products in world global consumption is expected to increase over the coming decade due to stronger demand growth in India and Pakistan in particular, which in turn is driven by income and population growth. World per capita consumption of fresh dairy products is projected to increase by 1.0% p.a. over the coming decade, slightly faster than over the past ten years, driven by higher per-capita income growth.

The level of milk consumption in terms of milk solids per capita will vary largely worldwide (Figure 7.1). Country income per capita and the impact of regional preferences will be important factors driving this consumption variation. For example, the per capita intake is expected to be high in India and Pakistan, but low in China. The share of processed dairy products (especially cheese) in the overall consumption of milk solids is expected to be closely related to income development, with variations due to local preferences and level of urbanisation.

In Europe and North America, overall per capita demand for fresh dairy products is stable to declining, but the composition of demand has been shifting over the last several years towards dairy fat, e.g. full-fat drinking milk and cream. Consumers may be influenced by recent studies that have shed a more positive light on the health benefits of dairy fat consumption. In addition, this shift may reflect increasing consumer preference for less processed foods.

The largest percentage of total cheese consumption occurs in Europe and North America, where per capita consumption is expected to continue to increase. Consumption of cheese will also increase where it was not traditionally part of the national diet. This is the case, for example in South East Asian countries urbanisation and income increases have resulted in more away-from-home eating, including fast food such as burgers and pizzas. The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionary, infant formula, and bakery products.

While some regions are self-sufficient, e.g. India and Pakistan, total dairy consumption in Africa, South East Asian countries, and the Middle East and North Africa is expected to grow faster than production, leading to an increase in dairy imports. As liquid milk is more expensive to trade, this additional demand growth is expected to be met with milk powders, where water is added for final consumption or further processing.

A small share of dairy products, especially SMP and whey powder, are used in animal feed. China imports both products for feeding and the African Swine Fever (ASF) outbreak reduced its demand. With the expected recovery (see Chapter 6 on meat), the feed demand for SMP and whey powder is expected to grow over the coming decade.

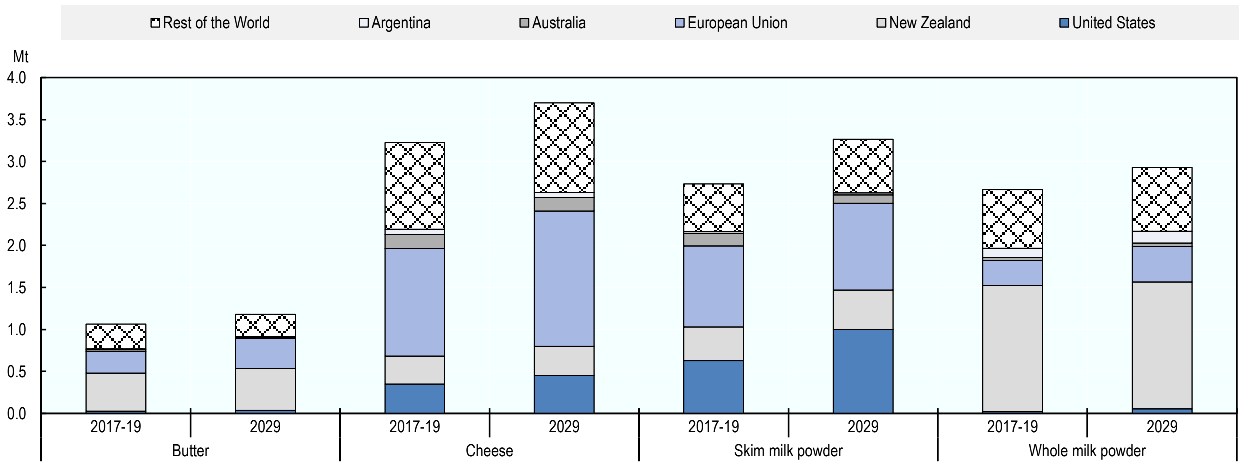
7.6. Trade

Approximately 8% of world milk production is traded internationally. This is primarily due to the perishability of milk and its high water content. However, imports of liquid milk by China from the European Union and New Zealand have increased considerably in recent years. China’s net imports of fresh dairy products over the base period were about 0.7 Mt, and this is projected to increase over the projection period by 3.6%

p.a. The trade share of WMP and SMP is high at more than 40% of world production, but these products are often produced only as a means to store and trade milk over a longer period or distance.

The three major exporters of dairy products in the base period are the European Union, New Zealand and the United States. These three countries are projected to jointly account for around 65% of cheese, 68% of WMP, 76% of butter, and 77% of SMP exports in 2029 (Figure 7.5). Australia, another exporter, has lost market shares although it remains a notable exporter of cheese and SMP. In the case of WMP, Argentina is also an important exporter and is projected to account for 5% of world exports by 2029. In recent years, Belarus has become an important exporter, orientating its exports primarily to the Russian market.

Figure 7.5. Exports of dairy products by region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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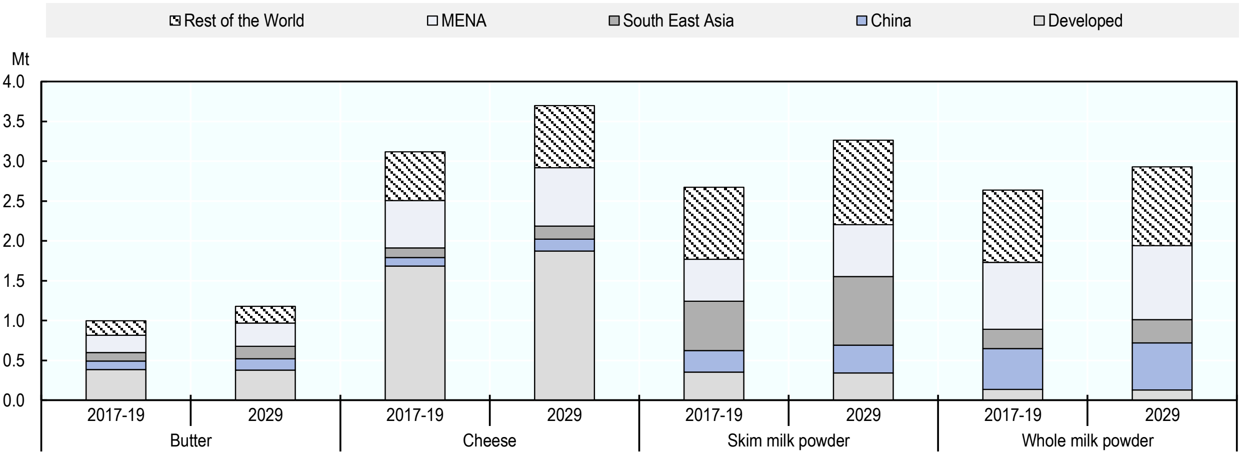
The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. It is projected that the European Union's share in world cheese exports will be around 44% by 2029, sustained by increased cheese exports to Canada via the CETA agreement and to Japan following the ratification of the bilateral trade agreement in 2019. The United Kingdom, the Russian Federation, Japan, the European Union, and Saudi Arabia are projected to be the top five cheese importers in 2029. These countries are often also exporters of cheese and international trade is expected to increase the choice of cheeses for consumers.

New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 42% and 52%, respectively, by 2029. In the case of WMP, trade between New Zealand and China, the principle importer of WMP, is expected to be considerably less dynamic over the projection period. The expected growth in domestic milk production in China limits the growth in WMP imports. It is expected that New Zealand will diversify and slightly increase its production of cheese over the outlook period.

Imports are spread more widely across countries, with the dominant destinations for all dairy products being the Middle East and North Africa (MENA), developed countries, South East Asia, and China (Figure 7.6). China is expected to continue to be the world's major dairy importer, particularly for WMP. Most of its dairy imports come from Oceania, although in recent years the European Union has increased its exports of butter and SMP to China. Imports by the Middle East and North Africa are expected to originate primarily from the European Union, while United States and Oceania are expected to be the main suppliers of milk powders to South East Asia. Developed countries import a high level of cheese and butter, around 54% and 39% respectively of world imports in 2017-19. These percentages are expected to decline slightly by 2029.

Figure 7.6. Imports of dairy products by region



Note: MENA refers to Middle East and North Africa; South East Asia contains Indonesia, Malaysia, Philippines, Thailand and Viet Nam.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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7.7. Main issues and uncertainties

The COVID-19 pandemic has affected daily life worldwide. It is assumed that food chains are less affected by the constraints implemented to limit its spread, although significant disruption of supply chains could occur for perishable products such as milk and dairy products. In addition, some dairy products like cheese are often consumed away from home (e.g. in burgers and pizzas) and may see a reduction in consumption levels. The effects over the coming decade are more uncertain as these depend on how long the constraints are kept in place, how fast the world economy will recover, and whether there will be any structural changes in global interactions.

World milk production could be constrained due to unforeseen weather events, especially as this concerns grazing-based milk production, the dominant production method worldwide. Climate change increases the chances of drought, floods, and disease threats all of which can affect the dairy sector in several ways (e.g. price volatility, milk yields, cow inventory adjustments).

Environmental legislation could also have a strong impact on the future development of dairy production. GHG emissions from dairy activities make up a high share of total emissions in some countries (e.g. New Zealand, Ireland) and any changes in related policies could affect dairy production. The increasing trend towards sustainable practices such as water access and manure management are additional areas where policy changes could have an impact. Nevertheless, stricter environmental legislation could also lead to innovative solutions that improve the long-term competitiveness of the sector.

Animal diseases and their spread could impact milk production. Mastitis is the most common infectious disease in dairy cattle worldwide and across all types of farm sizes. It is also the most damaging from an economic point of view, with a significant impact on milk yield and milk quality. Future developments in awareness, identification and treatment of this disease could lead to significant increases in milk production through smaller losses. In order to control many diseases, including mastitis, treatments based on antimicrobials are commonly used. This has raised concerns on the overuse of antimicrobials and the development of antimicrobial resistance, which would reduce the effectiveness of existing treatments and require the development of new ones. The evolution of this process remains an uncertainty for the next decade.

In recent years, the role of plant-based dairy substitutes (e.g. soya, almond, rice and oat drinks) in the fluid milk sector has increased in many regions, e.g. North America, Europe and East Asia. Causes include lactose intolerance, as well as discussions on the health and environmental impact of dairy products. The growth rates of plant-based dairy substitutes are strong, albeit from a low base, but conflicting views exist regarding their environmental impact and relative health benefits. As a result, there is uncertainty on the long-term impact these will have on dairy demand.

Changes in domestic polices also remain an uncertainty. In Canada, the SMP export projections are uncertain due to changes in its domestic dairy industry as a result of the World Trade Organization Nairobi Decision, which eliminates the use of export subsidies in agriculture beyond 2020. In the European Union, intervention buying of SMP and butter at fixed prices remains possible and this has had a considerable market impact in recent years.

Changes to or the creation of trade agreements would affect dairy demand and trade flows. For example, large amounts of cheese and other dairy products are traded between the European Union and the United Kingdom, and its continuation will depend on the determined trade relations following Brexit, while the USMCA is expected to influence dairy trade flows in North America. The Russian Federation’s embargo on several dairy products from major exporting countries is expected to end in 2020 and imports are expected to increase slightly, although they are not likely reach the pre-ban levels.

Dairy trade flows could be substantially altered by changes in the trade environment. To date, India and Pakistan, the big dairy consuming countries, have not integrated the international dairy market as domestic production is projected to expand fast to respond to growing internal demand.

Note

[1] Fresh dairy products contain all dairy products and milk which are not included in processed products (butter, cheese skim milk powder, whole milk powder, whey powder and, for few cases casein). The quantities are in cow milk equivalent.

8. Fish

This chapter describes the market situation and highlights the medium-term projections for world fish markets for the period 2020-29. Price, production, consumption and trade developments for fish from catch and aquaculture are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world fish markets during the coming ten years.

8.1. Market situation

After strong growth in 2018, with overall production, trade and consumption reaching historic peaks, the global fisheries and aquaculture sector declined slightly in 2019.[1] Aquaculture production continued to expand by over 2%, while capture fisheries declined by about 4% due to lower catches of certain species including cephalopods, cod and selected small pelagic species.

According to the FAO Fish Price Index,[2] international fish prices were about 3% lower, on average, in 2019 compared to the previous year. This was primarily due to price declines for many important farmed species, including shrimp, salmon, pangasius and tilapia, but also for canned tuna as a consequence of supply outpacing demand. Economic contraction in some countries, along with trade tensions between some selected key producers and importers, contributed to a slight decline in global trade of fish and fish products of about 1% in 2019 compared to 2018 in both volume and value.

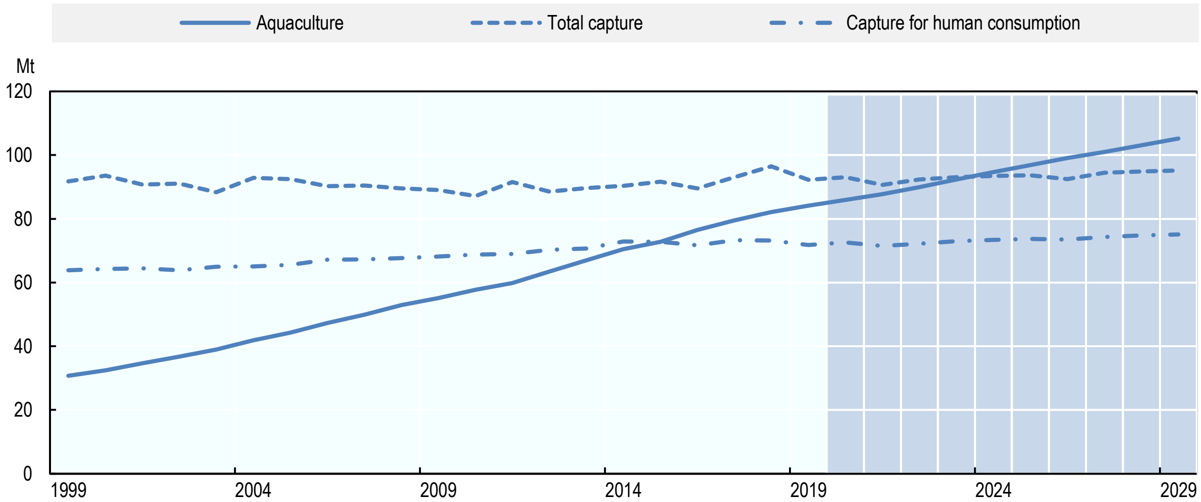
8.2. Projection highlights

Relative to the base period (2017-2019 average), nominal fish prices will increase at a rate between 1.5-2.1% p.a. over the next decade. In real terms, fish prices are projected to remain largely unchanged on average over the 2020-29 period – slightly negative for prices of fish oil, traded fish, capture fisheries and fishmeal; and slightly positive for aquaculture species. Despite differences in the magnitude, all prices are expected to follow similar trends, with small increases in the first half of the outlook period, followed by a decline in the second half. The factors contributing to that decline include faster growth in Chinese production and a reduced pressure on fish demand due to the recovery of the pork sector (as fish is one of the replacements for pork consumption) from the major outbreak of African swine fever (ASF). Due to the sustained demand for fishmeal and relatively stable supply, the price of fishmeal will continue to increase slightly relative to oilseed meals.

Global fish production is projected to reach 200 Mt by 2029, increasing by 25 Mt (or 14%) from the base period (average of 2017-19), though at slower pace (1.3% p.a.) than over the previous decade (2.3% p.a.). This slowdown of growth is driven by the combined effect of lower annual growth rates for both capture fisheries and aquaculture. One of the main factors behind these expected lower rates is the assumption that China's fisheries and aquaculture policies for the next decade will align with its 13th Five-Year Plan (2016-20), which shifted priorities towards promoting sustainability and the modernisation of the sector with initial capacity reduction, to be followed by an expected faster growth, in particular of aquaculture production. This is particularly relevant as China is by far the world's leading fisheries and aquaculture producer.

The contribution of aquaculture to global fish production should continue to grow (Figure 8.1) and surpass that of total capture fisheries (including the amount utilised for non-food uses) by 2024. By 2029, aquaculture production is projected to reach 105 Mt, 10 Mt more than the capture sector. Relatively low feed prices are also behind the future growth of aquaculture, and profitability in the sector is expected to remain high in the next decade, especially for species that require small amounts of fishmeal and fish oil. Capture fisheries are projected to see a moderate increase in production over the next decade (0.4% p.a.), notably due to expectations that improved management in several regions will continue to pay off including through a sustainable increased productivity of fish stocks. The share of capture fisheries production transformed into fishmeal and fish oil will remain stable at about 18%. However, total fishmeal and fish oil production are projected to increase by 10% and 17%, respectively, over the next decade, mainly reflecting a greater use of fish residues in their production. By 2029, the proportion of total fish oil obtained from fish waste is projected to grow from 41% to 45%, while for fishmeal this proportion will increase from 24% to 28%.

Figure 8.1. World aquaculture and capture fisheries



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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By 2029, it is projected that 90% of the fish being produced will be utilised for human consumption, growing from 155 Mt in the base period to 180 Mt. However, mirroring changes in production, the rate of increase in fish available for human consumption is projected to slow from 2.5% p.a. in 2010-19 to 1.4% p.a. Growth in per capita apparent[3] fish food consumption is also anticipated to slow, from 1.3% p.a. in 2010-19 to 0.5% p.a. over the projection period, reaching 21.4 kg by 2029. Nevertheless, per capita fish consumption is expected to continue to increase on all continents, except Africa, with the decline concentrated in Sub-Saharan Africa (-0.7% p.a. over the next decade), due to the population increasing more than supply. This raises potential nutritional concerns in the region, as fish represents an important source of animal proteins.[4]

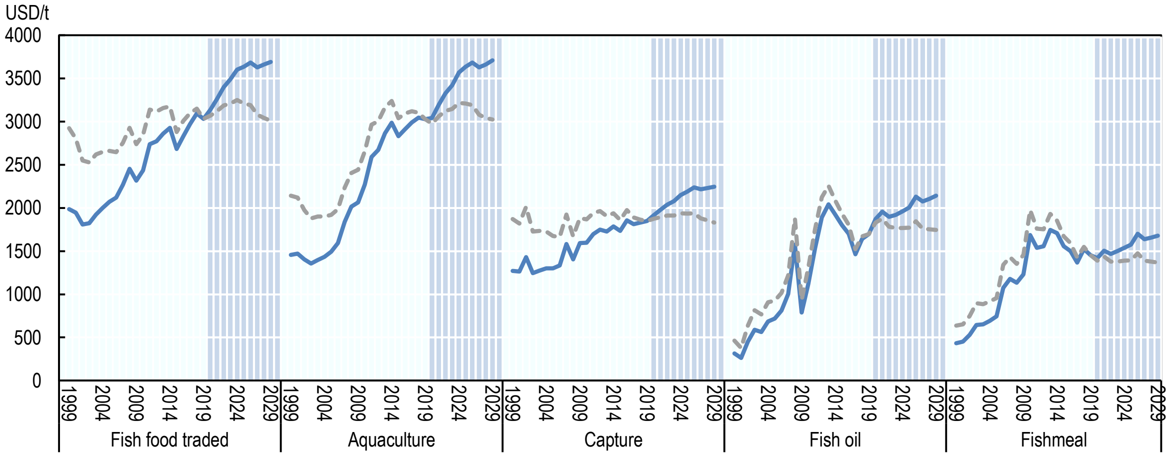
About 36% of total fish production is projected to be exported in different product forms: fish for human consumption, fishmeal and fish oil (32% excluding intra-EU trade). After a slight decline in 2019, world trade of fish for human consumption is projected to increase once again, at a rate of 1.1% p.a. over the coming decade and by a total of 4 Mt (or 9%) by 2029. This rate of increase is lower than that observed in the past decade (1.4% p.a.), reflecting the slowdown in production growth. As well as retaining their position as major fish producers, Asian countries should remain the world's main exporters of fish for human consumption, with their share in global exports increasing from 48% in 2017-19 to 50% in 2029. During the same period, OECD countries will remain the leading importers of fish for human consumption, although their share is expected to shrink from 53% to 50%.

Many factors can influence the evolution and dynamics of world fish production, consumption and markets and, as a consequence, a range of uncertainties exist when projecting into the future. These include external factors (climate, environmental conditions) and policy factors (fisheries management and governance, trade policies, and polices against illegal, unreported and unregulated fishing (IUU)). The implications of these uncertainties depend upon the extent to which they differ from the model's assumptions, and the sector's capacity to adapt to them. Possible impacts of the COVID-19 outbreak on fish markets were not accounted for in the projections, but its potential consequences are discussed in the main issues and uncertainties section (in the web version of the fish chapter).

8.3. Prices

Fish prices will continue to be high in the next decade relative to historical levels. In nominal terms, they are anticipated to follow an increasing trend over the duration of the projection period. In real terms, fish prices are expected to rise until 2024 and to decrease during the 2024-2029 period (Figure 8.2), notably reflecting the expected impact of Chinese fisheries policies. These policies are projected to lead to limited fish production growth in the country at the beginning of the outlook period, while productivity gains are expected to result in faster production growth during the rest of the projection period. In addition, fish prices are expected to be also impacted by the price trends of potential meat substitutes, and by how long the price of pork will be inflated by the devastating ASF outbreak.

Figure 8.2. World fish prices



Note: Fish food traded: world unit value of trade (sum of exports and imports) of fish for human consumption. Aquaculture: FAO world unit value of aquaculture fisheries production (live weight basis). Capture: FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction. Fishmeal: 64-65% protein, Hamburg, Germany. Fish oil: N.W. Europe. Real price: US GDP deflator and base year = 2019.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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The prices of wild caught fish are projected to fall 0.2% p.a. in real terms and result in a total decrease of 1.9% by 2029 compared to the base period. During the same period, aquaculture prices are projected to experience a very marginal increase in real terms in most years over the next decade, sustaining the profitability of aquaculture production in most years over the next decade. However, due to lower feed prices, which will shift supply upward, overall aquaculture prices are projected to decline by 2.0% in 2029 compared to the base period. In addition, the prices of traded fish products are projected to decrease by 2.8% in real terms over the outlook period, reaching a level lower than those observed in the 2010s but higher than in the 2000s.

The price of fishmeal will continue to increase slightly relative to oilseed meals. This results from fishmeal demand exceeding supply due to the expansion of aquaculture production and livestock breeding (mainly pigs and poultry). Fishmeal and fish oil represent a highly nutritious and digestible feed component and rich of Omega-3 fatty acids. Due to their relatively high price, they are increasingly used only for some species and at certain stages of animal rearing (for hatchery and finishing diets), which creates a premium for fishmeal over oilseed meals. For these reasons, the production of fishmeal and fish oil will remain profitable. Fishmeal prices will remain at high levels relative to substitute products despite a projected 7.4% decline in real terms over the outlook period due to a comparable decrease in oilseed meal prices. In

El Niño years, which will negatively impact the catches of species such as Anchoveta which are mainly used for the production of fishmeal and fish oil, the difference in the price ratio to oilseed meals will be accentuated, as fishmeal supplies will be reduced.

The popularity of Omega-3 fatty acids in human diets and the growth in aquaculture production have contributed to an increase in the fish to vegetable oil price ratio. It is assumed this high ratio will be maintained over the outlook period and magnified in years when *El Niño* occurs. Fish oil prices in real terms experienced a significant rise from 2009 to 2013, followed by a decline up to 2017. However, prices remained higher than in 2009. Fish oil prices are projected to rise during the projection period; by 2029, they are projected to have increased by 7.1% in real terms compared to the base period, partly due to a 2.5% increase in the price of vegetable oil. However, due to the expected fluctuations over the next decade, fish oil prices are projected to decline slightly by 0.5% p.a. during the same period.

8.4. Production

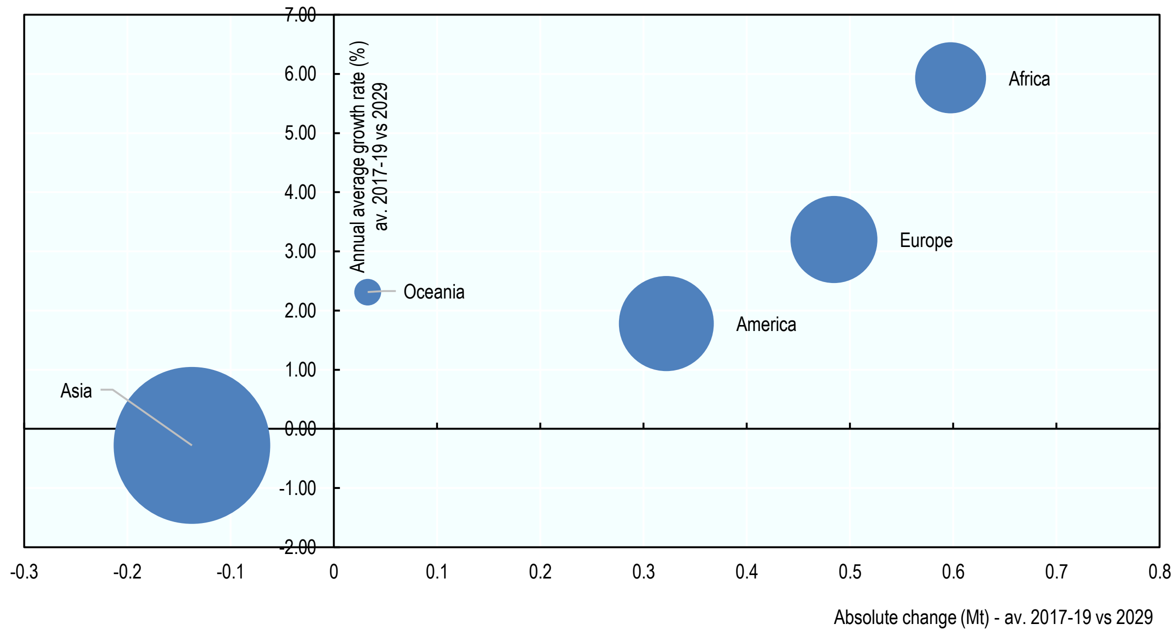
Global fish production (from capture fisheries and aquaculture) is projected to increase from 176 Mt in the base period to 200 Mt by 2029. While this represents an additional 25 Mt of fish per year by 2029, both the rate of growth and the absolute increase in production continue to fall. In absolute terms, the increase in total fish production over the outlook period is projected to be 73% of that observed over the previous decade, when world fish production was 34 Mt higher by the final year. In addition, the rate of growth (14.0% over the outlook period) should be lower than the 23.8% achieved over the previous decade. This reflects lower growth rates in the aquaculture (2.3% p.a.) and capture fisheries production (0.4% p.a.) when compared to the previous decade (4.3% p.a. for aquaculture, 0.7% p.a. for capture). Despite this slower growth,[5] aquaculture will remain the main driver of growth in fish production at the world level. Growing from a share of 47% of total fish production in the base year, aquaculture production is projected to overtake capture fisheries in 2024 and reach 52% by 2029.

Aquaculture production is projected to be 105 Mt by 2029, an increase of 28.4% relative to the base period, compared with 59.6% in the previous decade. This anticipated slowdown in aquaculture production growth will mainly be caused by lower productivity gains, more stringent environmental regulation and increasing scarcity of suitable locations due to competition from other land and water users. China, the world’s largest aquaculture producer, is expected to experience a substantial reduction in the growth rate of its farmed fish production. This results from the implementation of new policies favouring the sustainability and modernisation of the sector, which are projected to result in slower growth rates at the beginning of the outlook period, before picking up again towards the end of the outlook period. Overall, Chinese aquaculture production is projected to grow by 24.5% in the next decade, compared with 46.6% in the previous decade. By 2029, China is expected to account for 56% of global aquaculture production, compared with a share of 58% in the base period. At the world level, some of the reduced growth in Chinese production will be mitigated by greater increases in production elsewhere. Aquaculture production is expected to grow on all continents. The majority of world fish production will continue to originate from Asia, with a projected 89% of world aquaculture production by 2029.

Growth rates will vary across species, resulting in a change of the composition of aquaculture production by 2029. The share of dominant farmed species, such as carps and molluscs, is projected to decline to 56% by 2029, down from a peak of 77% in the mid-1990s. The share of shrimps and prawns and that of tilapia and catfish (including pangas) will increase over the outlook period.

Capture fisheries production is projected to increase slightly over the next decade (0.4% p.a.). By 2029, capture fisheries production is projected to reach 95 Mt, up 1.3 Mt compared with the base period. This upward trend is due to expectations of improved catches in some fishing areas stimulated by the relatively high fish prices or where stocks of certain species are recovering, also associated with better management which can increase the productivity of fish stocks and thus capture possibilities, as well as from reduced on-board waste and discards. The highest growth rate and largest increase in volume terms in capture fisheries production is expected in Africa, while Asia is the only continent projected to experience a decline, mainly linked to the expected reduced capture fisheries production of China (-10% by 2029 compared to the base period) (Figure 8.3). On a country basis, the largest increases in capture fisheries are projected in the Russian Federation (+0.6 Mt), the Philippines (+0.3 Mt), and Indonesia (+0.3 Mt). In the years of the El Niño6 phenomenon, capture fishery production in South America will decline, resulting in world capture production falling approximately 2% during these periods. The share of capture fisheries production destined for direct human consumption is projected to increase from 77% in 2017-2019 to 79%, or 2.3 Mt, by 2029. Most of the remaining 20 Mt is expected to be reduced to fishmeal and fish oil.

Figure 8.3. Growth in world capture fisheries production by continent



Note: The size of the bubble represents the average capture production (Mt) in 2017-2019.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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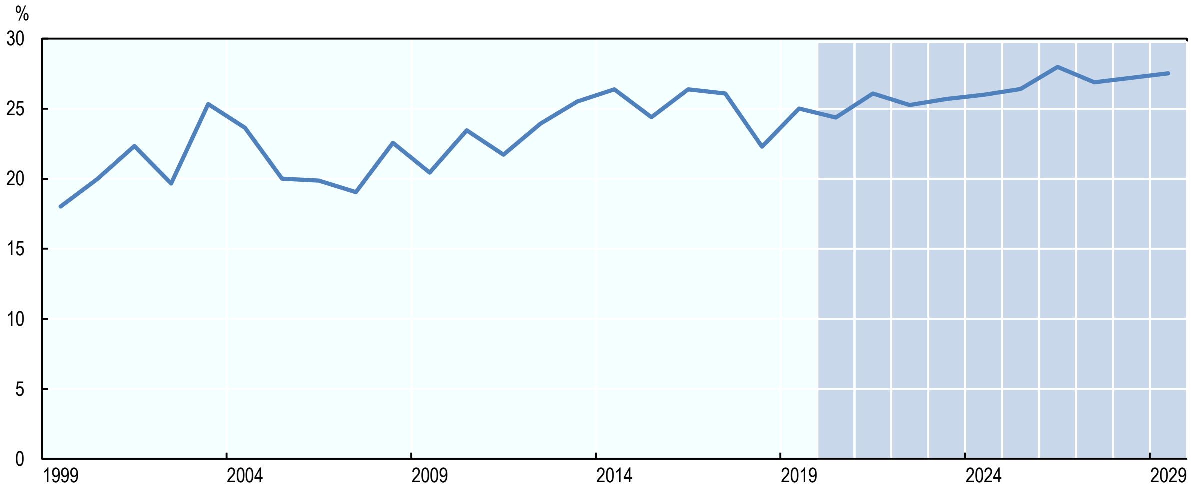
The production of fishmeal and fish oil is projected to grow by 10.2% and 17.2% respectively by 2029, compared to the base period, reaching 5.9 Mt and 1.4 Mt in product weight. They can be obtained either from whole fish or from fish residue, a by-product of processing. Despite the decline in the proportion of world capture fisheries production reduced to fishmeal and fish oil, the production of fishmeal and fish oil (in product weight) produced from whole fish is projected to increase in 2029 by 5.6% and 9.2%, respectively, compared to the base period. The drivers for such increase include the rather high price of fishmeal and fish oil, together with the anticipated higher capture fisheries production. A growing share of fishmeal and fish oil will be obtained from fish residue. In 2029, the amount of fishmeal obtained from fish waste is projected to account for 28% of total fishmeal production, up from 24% in the base period (Figure 8.4). For fish oil, the share is projected to reach 45% of total production by 2029, compared with 41% in the base period.

Figure 8.4. Share of total fishmeal production produced from fish residue



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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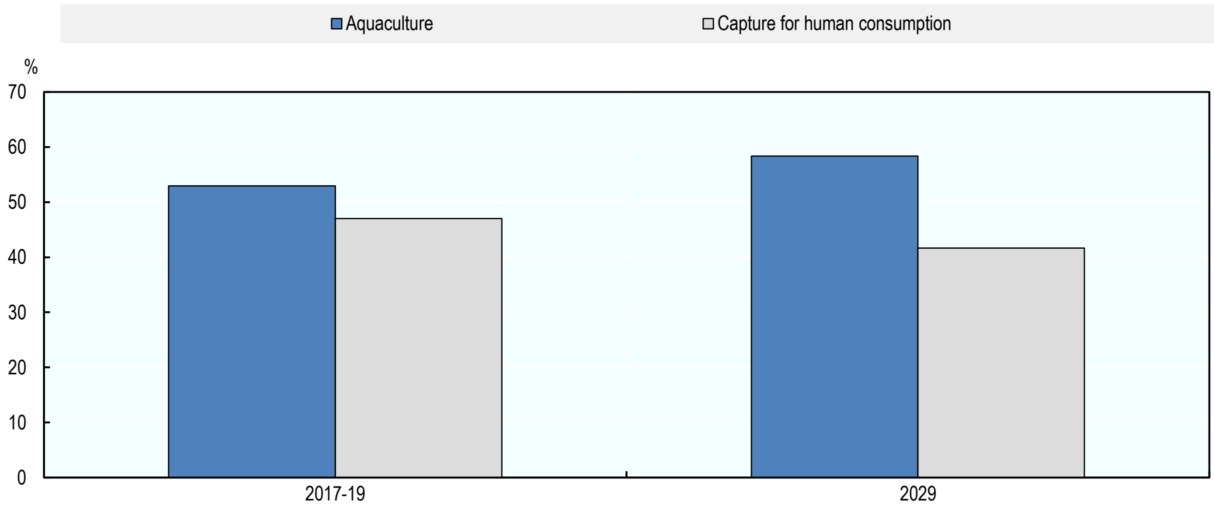
8.5. Consumption

By 2029, it is projected that 90% of fish production will be consumed as food. At the global level, fish for human consumption is projected to increase by 16.3%, or an additional 25 Mt, to reach 180 Mt by 2029. The amount of fish for human consumption will expand on all continents; however, the magnitude of the rise will vary from one continent to another, reflecting different fish consumption baseline levels and population growth rates. In terms of total fish food supply, the highest growth rate is projected in Africa (+25.4%) and the lowest in Europe (+5.8%), where consumption levels per capita reach high levels and are near saturation. With +17.3%, Asia does not have the highest growth but being by far the largest fish consumer, the continent will account for 75% of the additional amount of fish consumed by 2029. China on its own will account for 40% of that additional volume. Such growth will be enabled by rising incomes, a growing urban population and more diversity in the types of fish and product forms offered to Chinese consumers through domestic production and imports. The share of fish originating from aquaculture in total food fish consumption will continue to increase year after year. By 2029, 58% of the fish available for human consumption is projected to originate from aquaculture, up from 53% in 2017-19 (Figure 8.5).

On a per capita basis, apparent fish consumption is projected to be 21.4 kg in live weight equivalent (LWE) by 2029, up by 4.7% from 20.4 kg in 2017-2019 (Figure 8.6). This represents a lower increase than in previous decades. Overall, per capita apparent fish food consumption is projected to increase by 0.5% p.a. during the outlook period, compared to 1.3% p.a. over the previous decade. However, this trend will differ across and within countries in terms of quantity and product forms. This diversity arises from geographic, economic and cultural factors. Fish consumption per capita is projected to rise on all continents, except Africa. This is explained by the fact that growth in aquaculture and capture fisheries production, as well of imports of fish and fish products will not increase sufficiently rapidly to compensate the strong growth in population. In Africa, fish consumption per capita is projected to decrease to 9.9 kg LWE by 2029, down from a peak of 10.6 kg in 2014 and 10.2 kg in the base period. The decline will be even more significant in Sub-Saharan Africa. This situation is of particular concern because the region has the highest prevalence of undernourishment in the world and because fish is an important source of proteins and micronutrients in many African diets. Fish contributes on average to 23% of total animal protein intake in Sub-Saharan Africa, compared with 17% at the world level.

Figure 8.5. Share of aquaculture and capture in total fish available for human consumption, 2017-19 vs 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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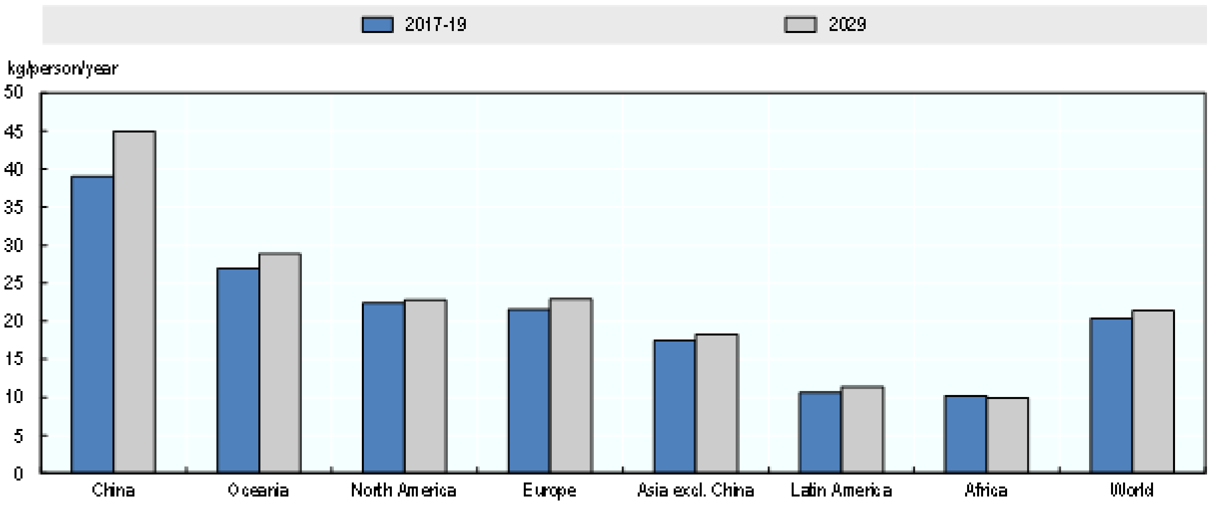
Figure 8.6. Per capita fish consumption – 2017-19 vs 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Among the 20 Mt of fish going to non-food uses, it is projected that the majority (83%) will be consumed as fishmeal and fish oil. The rest will serve other non-food uses such as ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, or as direct feed for farming. Due to their high prices and major innovation efforts, fishmeal and fish oil will continue to be used in more limited amounts in aquaculture feeds and to be more frequently used as strategic ingredients to enhance growth at specific stages of fish production. By 2029, it is projected that 83% of fishmeal and 66% of fish oil will be consumed as aquaculture feeds. China will continue to be the main consumer of fishmeal, with a projected share of 35% of the total by 2029. The European Union will remain the largest consumer of fish oil, accounting for

16% of total fish oil consumption, with about a quarter used as aquaculture feeds and three-quarters as other uses, including direct human consumption.

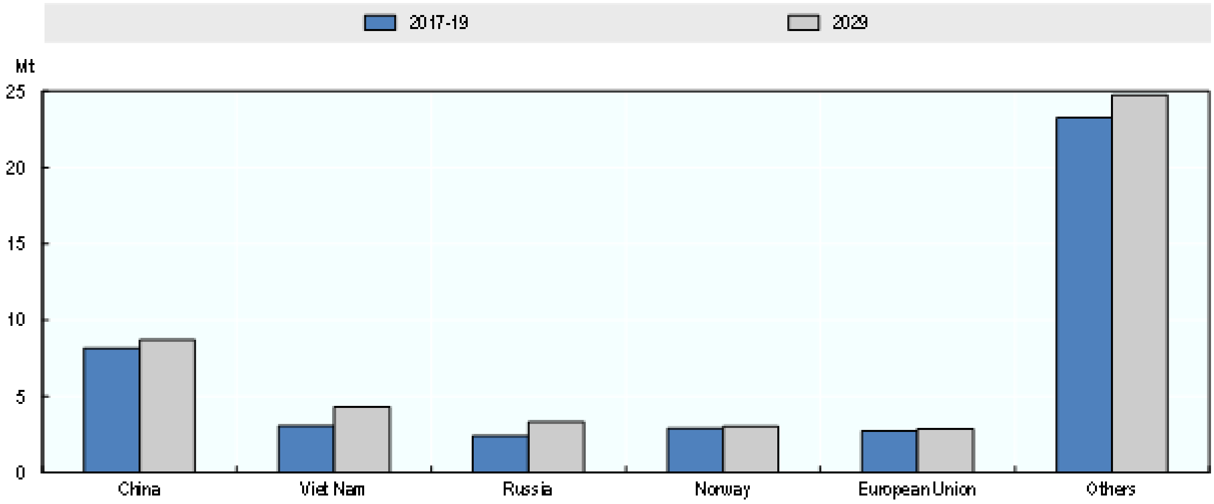
8.6. Trade

After contracting in 2019, global trade in fish and fish products is expected to expand over the coming decade, though at a slower pace compared to the previous decade. High demand, increasing fish production, improved logistics, and globalisation of food systems should further expand international fish trade. However, the slower growth of fish production will constrain the expansion of trade. By 2029, it is projected that about 36% of production will be traded (32% if excluding intra-EU trade). World exports of fish for human consumption are projected to reach 47 Mt LWE by 2029, an additional 4 Mt LWE in absolute terms when compared with the base period. This represents a rise of 9.4% in the next decade, more than halving the 23.0% increase in the previous decade.

The bulk of the growth in fish exports for human consumption is projected to originate from Asian countries, which will account for about 67% of the additional exports by 2029 (Figure 8.7). Asian countries, being the main producers, are expected to remain the major exporters. Their share in world exports for human consumption is projected to increase from 48% to 50% as a result of further expansion of their aquaculture production. China will remain the largest exporter of fish for human consumption. However, its share in global exports of fish for human consumption is projected to decline to 18% by 2029, compared with 19% in the base period. This reflects slower production growth in China, more fish being produced for domestic consumption, and strong growth in production and exports among large exporting countries, such as Viet Nam and the Russian Federation. These two countries are projected to see their exports grow by 36% and 34%, respectively, over the outlook period. Such growth will increase their share of global fish exports for human consumption to 9% and 7% respectively by 2029. The Russian Federation is expected to overtake Norway as the third largest exporter of fish for human consumption, in volume terms, by 2025. The factors contributing to this rise in Russian exports are the combined increase of fish production and imports of fish and fish products (+13% and +51%, respectively, in 2029 compared to the base period) and the Russian Federation's declining population.

339. The European Union, the United States, China, and Japan will continue to be the leading importers of fish for human consumption; they are projected to account for 19%, 12%, 10% and 7% of global imports respectively by 2029 (Figure 8.8). Imports by the European Union, the United States and China are projected to increase over the next decade (+4.9%, +3.9% and +5.6% respectively), but at a slower pace than in the previous decade. In Japan, the decline in imports is projected to accelerate (-9.2%), as younger generations favour meat over fish and the decline in population accelerates. In the United States and the European Union, imports are expected to grow at a slower pace as consumption levels of animal products are near saturation. In China, imports are projected to decline at 0.4% p.a. in the next decade compared with a growth of 4.3% p.a. in the previous one. This dramatic slowdown also reflects the implementation of Chinese policies, which point to an increase in the production of farmed fish destined for domestic consumption, which previously had to be imported. It is also linked to more moderate population and income growth compared with the previous decade. Among the leading importers, the Russian Federation is one of the few countries where growth in imports should be stronger in the next decade compared with the past ten years (+51% compared to –42%). Russian imports were particularly low between 2014 and 2019 as a result of economic sanctions related to the conflict in Ukraine and during the next decade a change of trading routes and partners is expected. Rising imports are also projected for Africa (+39%). With stronger projected growth in imports than in production, Africa is expected to become increasingly dependent on fish food imports. The share of imports in its fish food supply is projected to reach 40% by 2029, compared with 36% in the base period.

Figure 8.7. Exports of fish for human consumption by major exporters in 2017-19 and 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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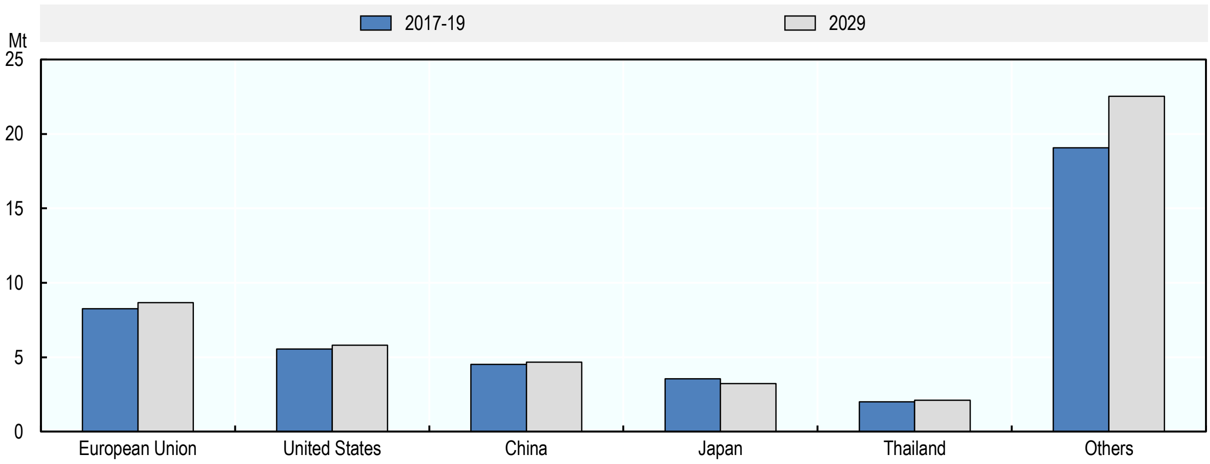
Figure 8.8. Imports of fish for human consumption by major importers in 2017-19 and 2029



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Exports of fishmeal are projected to increase during the next decade, growing 8.4% to reach 3.4 Mt (product weight) by 2029. Peru will remain the leading exporter of fishmeal, but its share in total exports is projected to decline from 34% to 31% over the outlook period. China will remain the largest importer, projected to account for 44% of total fishmeal imports by 2029. Globally, since aquaculture production is growing faster than fishmeal production, a greater amount of oilseed meals is used in aquaculture feed rations. This amount is projected to increase by almost 35% in 2029 compared to the base period. Fish oil exports are projected to increase by 19% over the next decade, mirroring the production trend. The European Union and Norway will be the main importers of fish oil in 2029, accounting each for nearly 25% of global fish oil imports. Fish oil is mainly used in the salmon industry and as food supplements.

8.7. Main issues and uncertainties

The projections in this *Outlook* assume stable macro-economic and climate conditions over the projection period, and make specific assumptions with respect to the impact of Chinese policies on fish production. A shock to any of these variables, as well as other unexpected shocks, could result in different outcomes. This section discusses some specific uncertainties that may arise over the projection period.

Trade policies are a major factor affecting trade dynamics and routes in fish markets. As a result, the implementation of new trade agreements over the outlook period could alter fish trade considerably. Multilateral trade agreements are proving difficult to ratify, but bilateral trade agreements may be more likely to occur over the projection period. Unexpected trade policy decisions could also affect the accuracy of the projections. For example, the trade dispute between China and the United States which has seen both countries impose tariffs on one another's fish and fish products has led to a drop in the volumes traded between the two countries, but also to increased export competition on other markets such the European Union. The Russian Federation ban on imports of food from the United States, Australia, Norway, Canada, and the European Union imposed in response to Western economic sanctions has also resulted in a large decline in fish imports and higher consumer prices.

Domestic fisheries policies also influence fish production trends. With China being the main capture fisheries and aquaculture producer and fish exporter, this is notably the case of China's current Five-Year Plan, which focuses on sustainability and modernisation of the sector. However, uncertainties remain regarding the exact effects of such policies on production and trade volumes and a slower or faster production growth than anticipated could have significant consequences on global production, trade and consumption volumes of fish and fish products.

More generally, government support policies through direct subsidies, tax exemptions or the financing of services to the fisheries sector also tend to encourage production. Changes to support policy patterns in the future, which could for example result from an agreement at the World Trade Organisation on the elimination of subsidies that encourage unsustainable fishing, could thus affect the reliability of projections.

The projections indicate that future growth in fish production will come primarily from aquaculture. Intensification, expansion into new spaces, and innovative technologies for land-based and offshore farms are expected to be the main drivers of growth. However, many factors have the potential to limit this growth such as, land and water reduced availability, disease outbreaks, feed, seed supply and genetic resources. Other means of production, such as land-based (e.g. recirculating aquaculture systems – RAS) aquaculture systems, have the potential to deliver a new supply source, if well managed. Limiting factors are likely to vary across regions. In developing countries, for example, the lack of an environmental policy might represent a higher threat than in developed countries.

Demand trends could also affect the projections. Changing consumer preferences, such as the rise in vegetarian or vegan lifestyles, are difficult to assess. Depending on the share of population adopting them, fish markets could be impacted either positively or negatively. Sustainability considerations will continue to influence the future demand of fish. One consequence of these trends is an increased requirement for transparency and traceability along the supply chain. Demand for fish also depends on trends observed in the animal protein sector. For example, the current ASF situation in China's pork production is leading to increased fish consumption.

The COVID-19 pandemic is having significant impacts on the global economy, including on the fisheries and aquaculture sector. The magnitude and duration of the current outbreak remain uncertain, but all steps from harvest to processing to trade to final consumption are likely to be impacted. In the short term, production, processing and distribution of fish could be affected by labour shortages, new regulations aimed at containing the pandemic, and blockages to transportation routes, as well as by a contraction of demand. Small-scale fishers and fish farmers, who represent a large share of those employed in the sector, are likely to be heavily impacted if they cannot sell their products or buy the required inputs. A global contraction of trade is also expected, which potentially has significant implications for the fisheries and aquaculture sector, as fish is a highly traded commodity. A more general loss of income-earning opportunities in the economy as a whole may also result in levels of fish consumption falling in poorer countries, due to demand being relatively income elastic. Restrictions on individuals' movements are also modifying consumption patterns and purchasing modalities. Out-of-home consumption, which is very important for fish, has already declined sharply in several countries and demand for fresh fish dropped, as consumers no longer go to the markets, while demand for canned, smoked and frozen fish is increasing. The effects over the medium term and over the rest of next decade are more uncertain as these depend on how long the constraints are kept in place, on the duration of the economic slowdown and the impact on income growth, as well as on the macro and fisheries-specific policy responses and industry initiatives taken in reaction to the crisis.

The drop in oil prices initiated in early 2020 could lower energy costs, which are key constraints for capture fisheries. However, the effects of such drop will depend on its duration and magnitude, as well as, at least in the short term, on the above-mentioned impacts of COVID-19. Lower energy costs could boost profitability in the sector, but while this may benefit fishers in some markets, in others it could lead to overfishing, particularly where enforcement is weak and the risk of IUU is high, placing additional pressure on resources.

Weather variability due to climate change[7] and changes in the frequency and extent of extreme weather events are anticipated to have a major impact on the availability and trade of fish and fish products, mainly through habitat destruction, changes in fish migration patterns, and natural productivity of fish stocks. However, for complexity reasons, climate change was not explicitly included in the modelling exercise of this *Outlook*, with the exception of the influence of *El Niño* events, which are explicitly accounted for in the modelling process (in 2021 and 2026) based on previous behaviour.

Notes

[1] In this chapter and publication the term "fish" and "seafood" are used to indicate fish, crustaceans, molluscs and other aquatic animals, but exclude aquatic mammals, crocodiles, caimans, alligators and aquatic plants. All quantities are expressed in live weight equivalent, except those of fishmeal and fish oil.

[2] Calculated in nominal terms, and covering fish and fish products.

[3] The term "apparent" refers to the amount of food available for consumption, which is not equal to the edible average food intake. The amount is calculated as production + imports – exports - non-food uses, +/- stocks variations, all expressed in live-weight equivalent.

[4] FAO, IFAD, UNICEF, WFP and WHO (2018), The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition, FAO Publications, Rome. Licence: CC BY-NC-SA 3.0 IGO.

[5] It is important to note that a slowdown in growth rate does not indicate a decrease in production. Expressed in percentage terms, growth rates are usually higher when the calculation starts from a low base, and decline as the size of the base grows.

[6] Assumed in the fish model for the years 2021 and 2026.

[7] Barange, M., et al. (Eds.) (2018), "Impacts of Climate Change on fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options", FAO Fisheries Technical Paper 627 http://www.fao.org/3/I9705EN/i9705en.pdf.

9. Biofuels

This chapter describes the market situation and highlights the medium-term projections for world biofuel markets for the period 2020-29. Price, production, consumption and trade developments for ethanol and biodiesel are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world biofuel markets during the coming ten years.

9.1. Market situation

Global biofuel production increased in 2019 in all major producing regions, although at slower rates than in the previous decade, and ample supplies translated into lower prices for ethanol and biodiesel. Biodiesel producing margins decreased, however, due to the increase in vegetable oil prices, while production margins of ethanol decreased in part because of higher sugar prices. Policies also played a strong role in the pricing of biofuels given specific subsidies, taxes and mandates.

Demand for biofuels has been sustained by various policies, including obligatory blending, preferential taxes, and subsidies, and growing global fuel demand. In some countries, increases in mandates and differential taxation systems or subsidies have supported demand for biofuels and influenced price developments.

9.2. Projection highlights

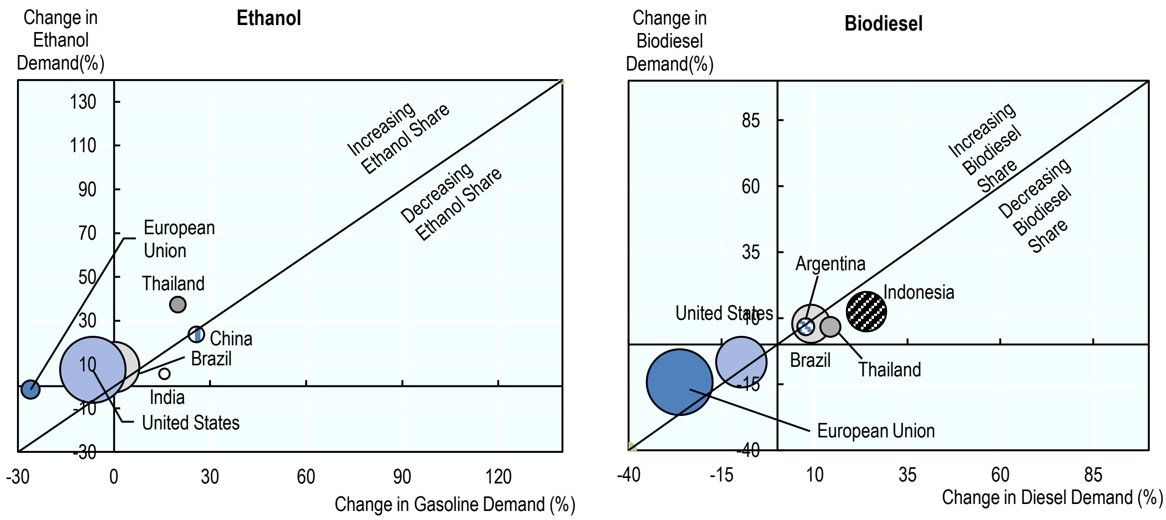
Global biofuel consumption is expected to continue to increase, primarily in developing countries, largely driven by higher blending targets. In developed countries, the expansion of biofuels will be limited in view of a decrease in total fuel demand and reduced policy incentives. World prices for biofuels are closely linked to developments in feedstock prices (which are mostly declining in real terms), crude oil prices (constant in real terms) and distribution costs, as well as biofuel policies. International biofuel prices are expected to increase over the outlook period in nominal terms but remain largely unchanged in real terms.

Future developments in biofuel markets will be largely driven by national support policies and fuel demands. The *IEA World Energy Outlook* (on which this *Outlook* bases its energy projections) foresees decreasing total fuel demand in the European Union and the United States, suggesting limited growth in biofuel consumption (Figure 9.1). In the European Union, the Renewable Energy Directive (RED) II classifies palm oil-based biodiesel under a high Indirect Land Use Change (ILUC) risk category. As a result, biodiesel consumption in the European Union is expected to fall below current levels. In the United States, biofuel demand is expected to be sustained by the Renewable Fuel Standard (RFS). However, the 10% ethanol blend wall is expected to constrain increases of domestic ethanol consumption during the projection period.

In Brazil, total fuel consumption is expected to increase. This, combined with the RenovaBio law which aims to reduce fuel emissions by 10% by 2028, is expected to lead to an increase in both ethanol and biodiesel consumption over the projection period. Biodiesel consumption is expected to keep pace with total diesel consumption, while the share of ethanol in gasoline consumption will increase slightly. Ethanol consumption in Brazil is projected to reach 39 bln L in 2029.

In 2017, the government of the People’s Republic of China (hereafter “China”) announced that a new nationwide E10 mandate would be implemented by 2020 to eliminate excessive maize ending stocks. With declining maize stocks, the main incentive to step up ethanol use has disappeared. This *Outlook* therefore assumes that the lower blending rate of 2% will be maintained up to 2029. Chinese ethanol consumption will increase with higher overall fuel use; however, the growth rate will decrease compared to the last decade.

Figure 9.1. Developments in biofuel demand in major regions



Note: Shares calculated on demand quantities expressed in volume. The size of each bubble relates to the consumption volume of the respective biofuel in 2019.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In Indonesia, total diesel use is expected to increase over the outlook period. In Argentina, biodiesel use is projected to reach the 15% blending mandate over the outlook period. It is expected that in Thailand the government will gradually reduce the current subsidy on biofuels and that its domestic feedstock supply to the biofuel industry will remain limited over the outlook period. Ethanol consumption growth in India is not expected to keep pace with total gasoline consumption growth (which is expected to almost double in the next ten years); however, by 2029, the ethanol-blending rate is projected to reach close to 5%.

As biofuel policies in many countries tend to support national markets, international trade volumes are relatively low. Global trade for biodiesel and ethanol as a share of total production is assumed to decrease over the coming decade. World biodiesel trade is expected to decrease drastically from current levels, largely reflecting declining demand for palm oil-based biodiesel in the European Union; ethanol trade will decrease moderately. On the export side, Argentine biodiesel exports are expected to increase slightly while exports from Indonesia are expected to decrease, reflecting high domestic demand.

The major risks and uncertainties for the future developments of the biofuel sector are related to the policy environment. This *Outlook* assumes the government of Indonesia will implement the B30 programme nationwide as planned, but reaching the intended target to increase biofuel demand will largely depend on the relationship between domestic and palm oil international prices. Higher production costs driven by higher palm oil prices and engine durability could jeopardise this target.

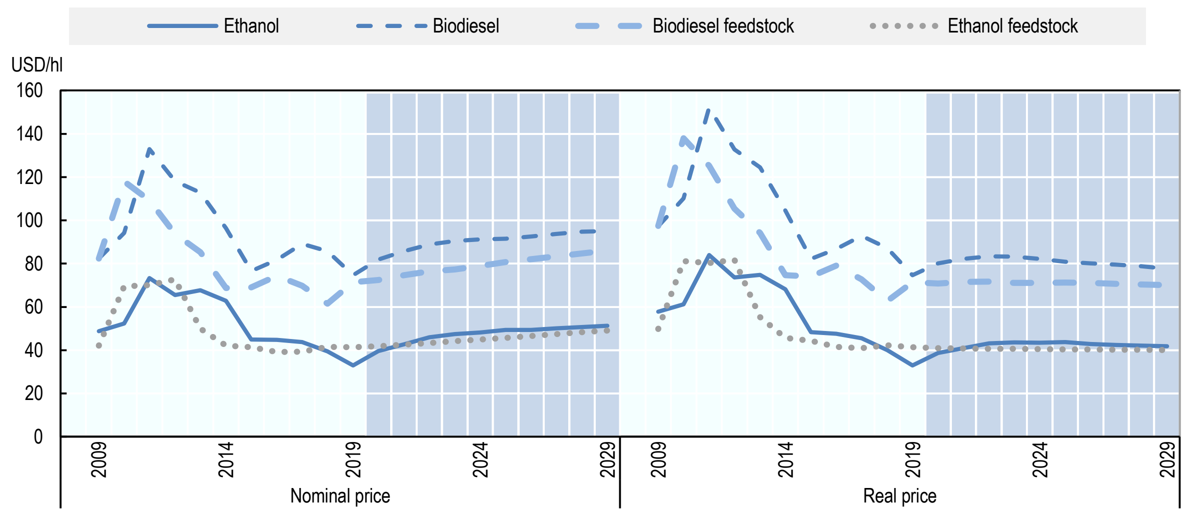
This *Outlook* expects that most of the biofuels produced will be based on agricultural feedstock. No substantial increase in advanced biofuels is expected before the middle of the outlook period. There is uncertainty over the price trajectory for crude oil, which is assumed to see moderately rising quotations over the projection period. Although countries are expected to advance on the implementation of new technologies in order to reduce greenhouse gas (GHG) emissions, there is uncertainty concerning subsidies and tax reductions as they apply to the energy and agricultural markets. New technologies will impact another driving factor of future biofuel demand, which is the development of electric vehicles (EV). Depending on the uptake of this technology and the policies that support its promotion, EVs could add to a potential decrease in the use of biofuels over the outlook period.

9.3. Prices

Influenced by developments on the vegetable oil markets, nominal biodiesel prices are projected to increase at a slower pace (1.5% p.a.) than ethanol prices (2.5%). Expressed in real terms, biodiesel prices are expected to decrease after 2023 and ethanol prices to resume a decreasing trend after 2026. The main reason for nominal ethanol prices performing more strongly than biodiesel is that ethanol prices are currently at historical lows and the recovery expected in the first years of the projection period will start from this low base. It should be borne in mind, however, that due to policies that include fiscal benefits or supported prices, international and domestic biofuel prices often diverge.

Figure 9.2. The evolution of biofuel prices and biofuel feedstock prices

Evolution of prices expressed in nominal terms (left) and in real terms (right)



Note: Ethanol: wholesale price, US, Omaha; Biodiesel: Producer price, Germany, net of biodiesel tariff and energy tax. Real prices are calculated based on the GDP deflator in the United States. As proxy for the biodiesel feedstock price, the world vegetable oil price is used, and for ethanol a weighted average between raw sugar and maize is applied.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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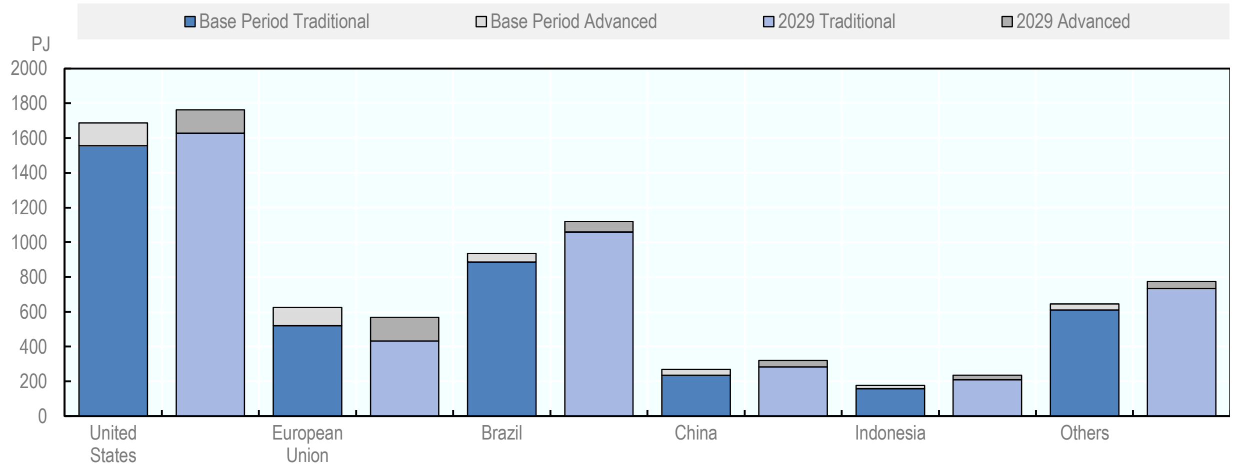
Globally, this *Outlook* expects biofuel production to increase at a much slower pace during the projection period than in previous decades. The primary reason is that changes in US and EU policies are reducing support to this sector. However, demand for biofuels is expected to grow in major developing countries given expected developments in the transportation fleet and domestic policies that favour higher blends and greater demand at the consumer level.

Global ethanol production is projected to increase to 140 bln L by 2029, while global biodiesel production is projected to reach almost 46 bln L, driven principally by the mandate increase in the United States over the initial projection years. Feedstocks for biofuel products vary from country to country. Global biofuel production will continue to be dominated by traditional feedstocks, despite the fact that increasing sensitivity to the sustainability dimension of biofuel production is observed in many countries (Figure 9.3).

Sugarcane and maize will continue to dominate ethanol feedstock. Ethanol production is projected to use 25% and 14% of global sugarcane and maize production respectively by 2029. Vegetable oil is expected to continue to be the feedstock of choice in biodiesel production. Biodiesel production based on used cooking oils will continue to play an important role in the European Union, Canada, and the United States.

Figure 9.3. World biofuel production from traditional and advanced feedstocks



Note: Traditional feedstocks are defined here as food and feed crop based biofuels. Values in Petajoule = 10^{15} Joule.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Box 9.1. Biofuels at a glance

Biofuels (bioethanol and biodiesel[1]) are fuels produced from biomass. At present, about 64% of ethanol is produced from maize, 26% from sugarcane, 3% from molasses, 3% from wheat, and the remainder from other grains, cassava or sugar beets. About 77% of biodiesel is based on vegetable oils (37% rapeseed oil, 27% soybean oil, and 9% palm oil) or used cooking oils (23%). More advanced technologies based on cellulosic feedstocks (e.g. crop residues, dedicated energy crops, or woods) do not account for large shares of total biofuel production. The international biofuel sectors are strongly influenced by national policies having three major goals: farmer support, reduced GHG emissions, and/or reduced energy independency.

Table 9.1. Biofuel production ranking and major feedstocks

	Production ranking (base period)		Major feedstocks	
	Ethanol	Biodiesel	Ethanol	Biodiesel
United States	1 (48.2%)	2 (19.5%)	Maize	Soybean oil
European Union	4 (4.9%)	1 (34.1%)	Sugar beet /wheat /maize	Rapeseed oil / used cooking oils
Brazil	2 (26.2%)	4 (12.0%)	Sugarcane / maize	Soybean oil
China	3 (8.1%)	8 (2.2%)	Maize / cassava	Used cooking oils
India	6 (2.1%)	14 (0.4%)	Molasses	Used cooking oils
Canada	7 (1.4%)	10 (0.7%)	Maize / wheat	Canola oil / soybean oil
Indonesia	21 (0.2%)	3 (12.3%)	Molasses	Palm oil
Argentina	9 (0.9%)	5 (6.6%)	Molasses / maize	Soybean oil
Thailand	8 (1.4%)	6 (3.6%)	Molasses / cassava	Palm oil
Colombia	13 (0.4%)	10(1.4%)	Sugarcane	Palm oil
Paraguay	14 (0.4%)	17 (0.03%)	Sugarcane	Soybean oil

Note: Numbers refer to the position that countries take in global production ranking; percentage numbers refer to the production share of countries in the base period.
1. Biodiesel includes renewable diesel (also known as Hydrotreated Vegetable Oil or HVO) in the accounting of this *Outlook* although both are different products.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

The share of energy that enters the transport sector through biofuels exceeds 10% in only one country, Brazil. Yet a goal of many biofuel policies, especially in developing countries, is to reduce energy dependency from fossil sources. This goal is far from being achieved.

United States

In 2019, the Environmental Protection Agency (EPA) decided to increase the advanced biofuel mandate in 2020 (+0.6 bln L) and to maintain the biodiesel sub-mandate in 2021. An important part of the initial Renewable Fuel Standards (RFS2) proposed in the 2007 Energy Independence and Security Act (EISA) were waived for the total advanced and cellulosic mandates on the basis that the production capacity for cellulosic ethanol had not been developed; the conventional gap,[1] often referred to as an implied maize mandate, was maintained at 56.8 bln L.

This *Outlook* assumes that the US government will keep all mandates set by EPA at recently announced levels in volume terms despite the projected decrease in the use of transportation fuel. The consumption of ethanol is projected to increase from 55.4 bln L to 59.8 bln L by 2029 (Figure 9.6). The 10% ethanol blend wall[2] is assumed to constrain domestic ethanol use over the next decade, which is projected to increase only moderately to 11.2% by 2029 as current discussions about developing E15 infrastructures have not been promoted nationwide.

Growth in ethanol production is projected to be limited to 0.5% annually (Figure 9.6). Corn is assumed to be the main feedstock for ethanol production, accounting for 98% of production in 2029. The production capacity for cellulosic ethanol is assumed to remain constant over the projection period. This *Outlook* does not expect a large export potential for the United States. Although it is projected to maintain its position as the world's largest ethanol producer, US global production shares are projected to decrease from 48% to 45%. The US production of biodiesel is projected to decrease 0.1% annually (Figure 9.6). The US global production shares are projected to decrease from 20% to 18%.

The European Union

Since 2010, EU legislation related to biofuel support has been based on the 2009 Renewable Energy Directive (RED), which requires that at least 10% of transport energy use in EU Member States be based on renewables by 2020. In June 2018, agreement was reached to increase the biofuel target to 14%, with national caps to food and feed crop-based biofuels at 1 percentage point above 2020 levels but not exceeding 7%. The new framework was adopted under Directive 2018/2001 (the RED II) on 11 December 2018 and will be implemented by 2030.[3] RED II classifies palm oil-based biodiesel under a high ILUC risk category and thus consumption of this biodiesel is expected to decline.

According to the IEA baseline used for this *Outlook*, total energy use in the transport sector is projected to decrease for diesel and gasoline. The decrease for diesel-type fuels is strong; ethanol consumption is projected to increase (+0.1 bln L), while biodiesel consumption is projected to decrease in absolute terms (-1.7 bln L). Palm oil-based biodiesel constitutes a large share of this decrease in view of the EU sustainability concerns associated with palm oil production. Biodiesel produced from other vegetable oils is expected to decrease as well, but less significantly, while production from used cooking oils is projected to remain stable. Given these projected demands for the biodiesel sector, the European Union is expected to continue being the world's largest biodiesel-producing region in 2029, although global production shares are expected to decrease from 34% to 28%.

Total EU biofuel consumption in 2029 is projected to decrease by 0.7% annually, but the share of advanced biofuel sources is projected to increase from 17% today to 24% by 2029 (Figure 9.3).

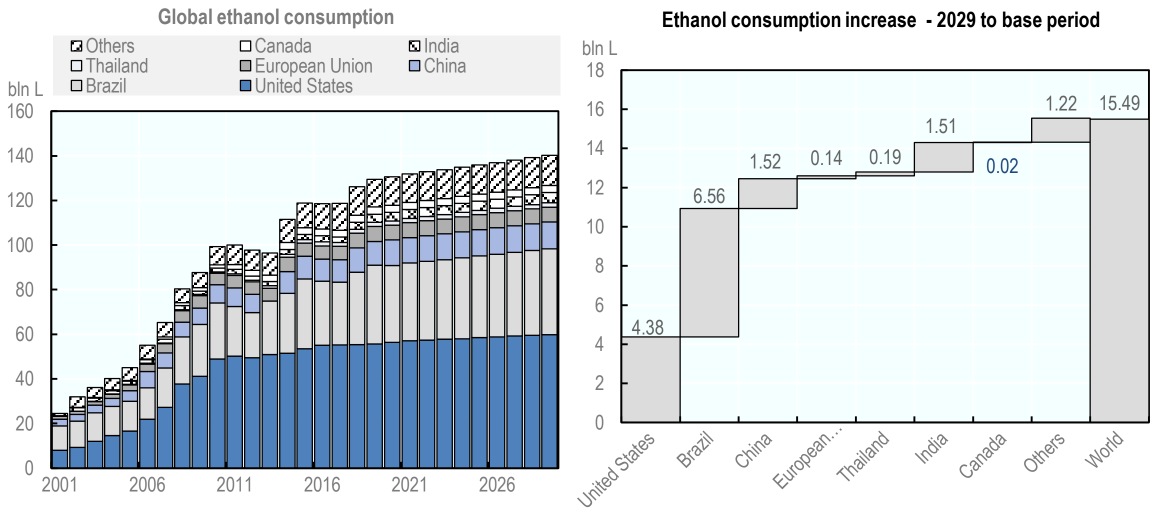
Brazil

Brazil has a large fleet of flex-fuel vehicles that can run on either gasohol (a mix of gasoline and anhydrous ethanol) or on E100 (hydrous ethanol). For gasohol, the government can vary the ethanol blend rate between 18% and 27%, depending on the price relationship between domestic sugar and ethanol. The current percentage requirement for ethanol is legislated at 27%. There is also a differentiated taxation system that favours hydrous ethanol over blended gasohol in key Brazilian states. For biodiesel, the government is assumed to increase biodiesel blend ratio from 11% to 12% during the projection period.

The largest ethanol consumption and production increases projected in this *Outlook* are expected to come from Brazil (Figure 9.4), due mainly to its RenovaBio programme.[4] This programme was officially signed in January 2018 and is intended to reduce the emissions intensity of the Brazilian transport sector in line with the country's commitments under COP 21. To create the necessary incentive structure, RenovaBio will introduce a system of tradeable carbon savings credits similar to those in California's Low Carbon Intensity Program. It might take a few years until current production trends change, but strong increases in production should be expected once trends change. Brazil is assumed to contribute 39 bln L to global production and use growth (+6 bln L). In 2029, more than half of the total Brazilian ethanol production is projected to be consumed by high blend flex-fuel vehicles, implying an increase of this fleet.

In contrast to the United States and the European Union, total fuel consumption of gasoline and diesel in Brazil is projected to increase over the coming decade (Figure 9.4), underpinning the potential growth of blending biofuels to gasoline and diesel. As a consequence, this *Outlook* projects that both ethanol market volumes and biodiesel consumption will increase in Brazil.

Figure 9.4. Development of the world ethanol market



Note: Blue shaded number means reduction in the right graph.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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China

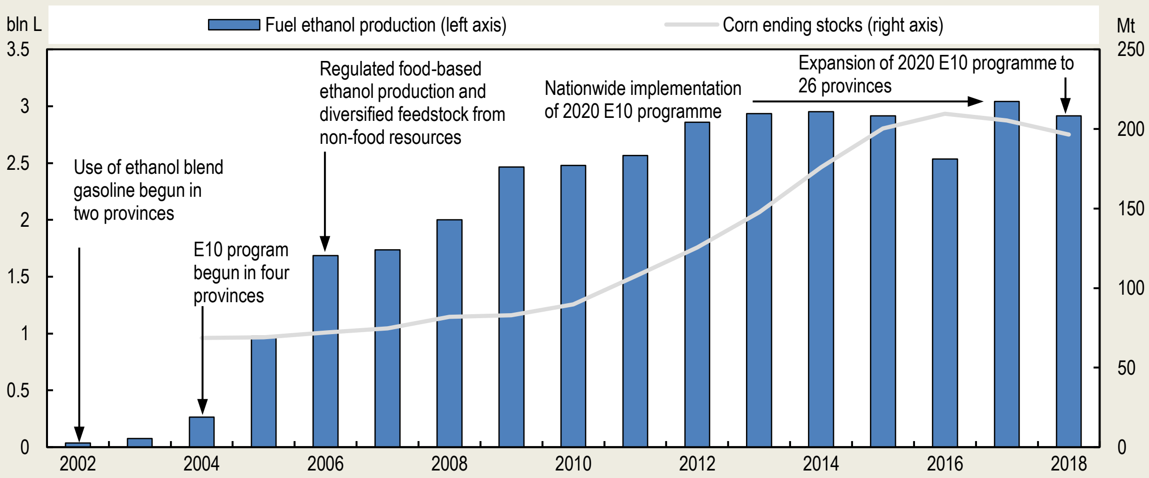
In 2017, China announced a new nationwide E10 mandate aimed at eliminating excessive maize stocks. In 2018, the government announced it would expand this programme from 11 to 26 provinces[5] by 2020. As these stocks decline, which has been the case since 2017, the main incentive to step up ethanol use is disappearing. This *Outlook* assumes that the blending rate of 2% will be maintained to 2029. Chinese ethanol consumption will increase with higher overall fuel use, although the growth rate will decrease compared with the last decade. This is projected to correspond to a production increase of 2 bln L as the *Outlook* assumes most of the ethanol demand will be produced from domestic feedstocks. Biodiesel in China will continue to be used more for cooking oil, which has limited growth potential.

Box 9.2. Chinese biofuel programme

To deal with excessive grain stocks, energy security, and air pollution, the Chinese government has imposed the use of E10 (10% blend of ethanol to gasoline) since 2002. Maize is a major feedstock for ethanol production. Between 2007 and 2015, a temporary purchasing and storage price system stimulated domestic maize production; however, a large share of this production remained unsold and eventually piled up as excessive ending stocks. These stocks are estimated to have increased from 82 Mt in 2008 to 209 Mt in 2016 (Figure 9.5).

It became essential for the government to eliminate this excessive stock and in 2017 it implemented the E10 utilisation programme. In August 2018, the government announced it would extend this programme from 11 to 26 provinces by 2020 and projected that as result ethanol consumption would increase to 13.6 bln L by that same year. In 2018, maize accounted for 65.1% of ethanol production, 25.6% of ethanol production was produced using cassava and 9.3% using wheat[1].

Figure 9.5. Chinese ethanol production and corn ending stocks



Source: Agricultural Market information System (AMIS) (2019) database. http://www.amis-outlook.org/. US Department of Agriculture, Foreign Agricultural Service (USDA-FAS) (2019) China – Peoples Republic of Biofuels Annual. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Biofuels Annual_Beijing_China - Peoples Republic of_8-9-2019.pdf.

Chinese petroleum consumption for transport has nevertheless increased steadily, causing serious air pollution problems. For example, the release of PM 2.5 particles[2] is very high in Beijing and other urban areas. The E10 programme seeks to alleviate this pollution, but its implementation would require large amounts of additional maize, cassava, wheat and/or sugarcane as feedstock. It should be noted that the Chinese government has actively promoted the implementation of the New Energy Vehicles (NEV)[3] credit mandate, which imposes a 10% minimum production requirement for the car manufacturing industry in 2019. This will increase to 12% in 2020. Several additional incentives exist to encourage the use of rechargeable batteries and the government issues specific vehicle plates for NEV users. These developments have made China the largest user of electric vehicles (EV). In 2018, the country accounted for 45% of global EV stocks, and the market share of EVs in China itself increased to 4.5%, higher than in the United States and Japan. The Chinese government has targeted that by 2030 NEVs would comprise 40% to 50% of all vehicles.

In the interim, the government has continued to promote the use of ethanol as a transport fuel. During the early 2000's, energy security and air pollution problems were the main incentives for this. Fuel ethanol production and maize ending stocks had a positive correlation (0.8209 from 2006 to 2015), and the country's biofuel programme came to depend on these stocks. Based on data from the Agricultural Market Information System (AMIS), there has been a decreasing trend since 2018 of maize ending stock levels (Figure 9.5), with the result that the government is losing the incentive to achieve its goal of increasing fuel ethanol use nationwide. It is therefore assumed that the blend rate will not change from its current level (2.1% in 2018), and that there will be a decreasing trend for maize ending stocks in the short term. There is also uncertainty whether the government can satisfy the NEV share target by 2030, which will depend on R&D and policies to promote its utilisation.

Notes: 1. US Department of Agriculture, Foreign Agricultural Service (USDA-FAS) (2019) China – Peoples Republic of Biofuels Annual. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Biofuels Annual_Beijing_China - Peoples Republic of_8-9-.
2. PM2.5 particles are air pollutants with a diameter of 2.5 micrometres or less, small enough to invade even the smallest airways. These particles generally come from activities that burn fossil fuels, such as traffic, smelting, and metal processing.
3. NEV includes Electric Vehicles (EV), Plug-in Hybrid Electric Vehicles (PHEV), and Fuel Cell Electric Vehicles (FCV).

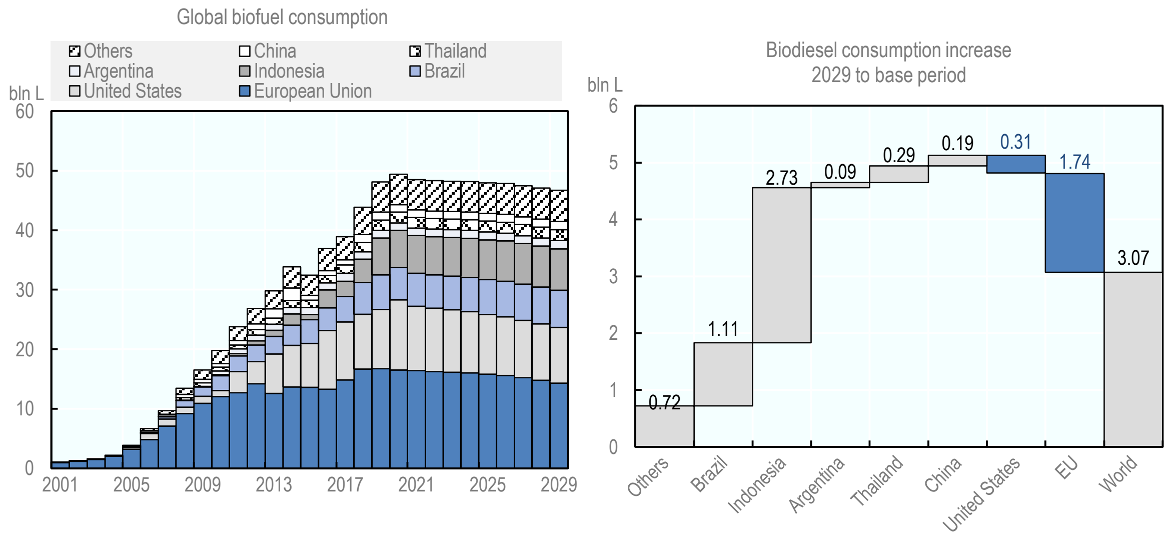
Indonesia

The implementation of B30 (Biodiesel 30% blend) aims to reduce the country's dependency on imported fossil fuels. In recent years, biodiesel production has increased due to the national biodiesel programme, which provides support to biodiesel producers and is financed by the crude palm oil (CPO) fund. Biodiesel production in Indonesia is projected to remain stable at around 7.0 bln L by 2029. The policy to support biodiesel producers relies on international prices, specifically the price wedge between domestic and international palm oil prices that defines the amount of the levy to be collected. The blending rate is projected to remain around 30% over the projection period and domestic use could increase to reach 7.0 bln L. Exports are expected to decrease considerably due to EU regulations that favour biodiesel imports produced with soybean oil.

Argentina

Argentina has blending mandates of 10% for biodiesel and 12% for ethanol. Increases to the biodiesel mandates are under discussion, especially in view that the two major export markets, the United States and the European Union, have filed anti-dumping import duties on Argentina. Tax exemptions should continue to boost the development of the Argentinean biodiesel industry, which exports more than half of its production. However, trade barriers set by the United States will likely limit export demand for this country's biodiesel. The production and export are projected to increase by 2.0% and 2.9%, respectively.

Figure 9.6. Development of the world biodiesel market



Note: Blue shaded number means reduction in the right graph.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.
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India

The National Policy on Biofuels came into effect in May 2018. The main objectives are to achieve 20% ethanol and 5% biodiesel blending. These are substantially above the current 1.4% and 0.1% blending levels. The main limitation to biofuel production growth assumed over the outlook period is the availability of feedstocks. Projected molasses production in India would not be sufficient to meet the increasing demand from the biofuels industry. Although non-edible grains would be eligible for producing ethanol, projected decreases in stocks-to-use ratio of feed grains (maize and other coarse grains) indicate tight markets and no increase of grain-based ethanol is expected. Limited access to feedstock, limited production capacity, and the lack of a proper distribution system are constraints for biofuel production in India.

Thailand

Thai cassava production is heavily focussed on export markets because international prices are higher than those offered by the local biofuels industry. Feedstock availability constrains ethanol production from molasses, cassava and palm oil. The government will gradually reduce the current subsidy on ethanol and biodiesel until 2022, foresees cuts in the ethanol and biodiesel targets by 2036. As a result, domestic supply to the biofuels industry will remain limited over the outlook period. While sugarcane would be an alternative, investment in sugarcane mills that can process ethanol is limited and no policy changes to allow for this are envisaged. Domestic feedstock supply to the biofuel industry will remain limited over the outlook period.

Canada

The Canadian Clean Fuels Standard (CFS) and provincial blend mandates promote biofuels use in Canada. The CFS policy, currently under negotiation, aims to reduce GHG emissions from the fuels consumed by introducing Carbon Savings Credits. The ethanol use ratio to gasoline is projected to increase to 7% by 2029 and biodiesel use ratio is assumed to stay at the current level.

Colombia

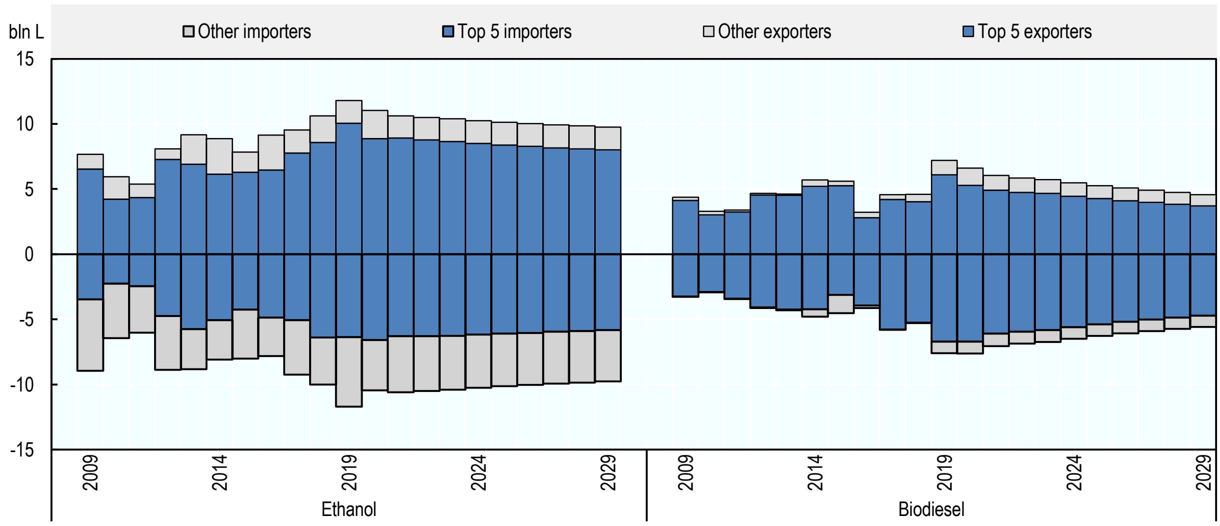
Ethanol demand is projected to increase over the projection period. Since the projected growth rate in ethanol demand is less than the projected growth rate in fossil fuel demand, the blend rate is expected to decrease slightly. This *Outlook* assumes that the E10 mandate is already fulfilled. The main feedstock is currently sugarcane and projections assume this will continue over the outlook period. In line with historical developments, ethanol is expected to increase in importance as an alternative source of income for the Colombian sugarcane industry. By 2029, it is projected that about 22% of the sugarcane production will be used for ethanol production. Biodiesel demand is projected to increase marginally at 1.8% p.a. over the projection period, to reach 0.7 bln L in 2029.

9.4. Trade

Global ethanol trade is projected to remain as a low share of global production, decreasing from 9% over the base period to 7% by 2029. The United States is expected to remain a net exporter of maize-based ethanol. However, US ethanol exports should decrease over the projection period because of a combination of strong domestic demand and weak production. Brazilian ethanol exports are not expected to expand over the projection period given that the Brazilian ethanol industry will mostly fill sustained domestic demand.

Argentine biodiesel exports are expected to increase while exports from Indonesia are expected to decrease, reflecting high domestic demand in Indonesia. Argentina should remain the lead biodiesel exporter, followed by the European Union (mainly exports to the United Kingdom) and United States. Argentinian exports are not expected to expand over the projection period due to weak international demand.

Figure 9.7. Biofuel trade dominated by a few global players



Note: Top five ethanol exporters in 2029: United States, Brazil, European Union, Pakistan, United Kingdom. Top five ethanol importers in 2029: Brazil, United States, Japan, Canada, United Kingdom. Top five biodiesel exporters in 2029: Argentina, European Union, United States, Indonesia, Canada. Top five biodiesel importers in 2029: European Union, United States, United Kingdom, Canada, Peru.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142938

9.5. Main issues and uncertainties

The major risks and uncertainties for the future development of the biofuels sector are related to the policy environment and oil prices. Policy uncertainty includes uncertainties about changes in mandate levels, enforcement mechanisms, investment in non-traditional biofuel feedstocks, tax exemptions for biofuels, and EV technology and policies for its promotion. This *Outlook* makes many projections on the expected fill rates of mandates and in many cases these are considerably lower than 100%.

This *Outlook* assumes the government of Indonesia will have successfully introduced B30 programme. However, reaching this target will largely depend on the relationship between domestic and international prices. At the time, the government first promoted biodiesel production, the price of palm oil increased rapidly from 2006 to 2008, and feedstock costs thereafter accounted for 86% of total production costs. These costs reduced biodiesel output and the original national target was not attained as scheduled by 2010.[6] The engine durability for B30 could also put the blending target into jeopardy.

The international crude oil price has dropped sharply since March 2020 because of weak global demand resulting from COVID-19, and the global imbalance of supply and demand. These factors may be transitory in nature, but could also usher in a longer period of low crude oil prices. This would contribute to a more lasting decline in gasoline and diesel prices, which in turn would lower demand for biofuels, including hydrous ethanol demand for Flex Fuel Vehicles (FFV). The Brazilian ethanol demand could be impacted from the crude oil price shock as hydrous ethanol accounted for 68% of total ethanol demand.[7] Most biofuels in Brazil are used for blending with fossil fuels. The blending targets are mandated on the biofuel industries in the medium to long term. However, the price shock could affect costs of production and supply chains, and thereby risk delaying the implementation of the policy targets and initiatives. In addition, an economic recession due to COVID-19 could reduce global transportation fuels and biofuel demand.

This *Outlook* expects that most biofuels will continue to be based on agricultural feedstock. No substantial increase in advanced biofuels technology is expected before the middle of the outlook period. The price trajectory for crude oil, which is assumed to see moderately rising quotations, could create some uncertainty for this sector. As such, a driving factor of future biofuel demand is related to the development of national transportation fleets. The automotive industries in the European Union, China, United States, and Japan are currently investing in EVs and, depending on the uptake of this technology and the policies supporting its promotion, these vehicles could add to a potential decrease in the use of biofuels by 2029.

Notes

[1] The conventional gap is the difference between the total and advanced mandates as defined by the Renewable Fuel Standard (RFS2).

[2] The blend wall in this context is the maximal achievable national average blending rate, given that most pumps in the United States offer only E10. This assumes that several E15 pumps will be developed over the coming years.

[3] https://ec.europa.eu/jrc/en/jec/renewable-energy-recast-2030-red-ii.

[4] http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/lei/L13576.htm.

[5] Eleven provinces accounted for 46.1% of China's total population (2017).

[6] Tatsuji Koizumi (2014), *Biofuels and Food Security: Biofuel impact on Food Security in Brazil, Asia and Major Producing Countries*, Springer, pp. 50-51.

[7] US Department of Agriculture, Foreign Agricultural Service (USDA-FAS) (2019) "Brazil, Biofuels Annual, 2019", https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Biofuels%20Annual_Sao%20Paulo%20ATO_Brazil_8-9-2019.pdf.

10. Cotton

This chapter describes the market situation and highlights the medium-term projections for world cotton markets for the period 2020-29. Price, production, consumption and trade developments for cotton are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world cotton markets during the coming ten years.

10.1. Current market conditions

After a fall in 2018, global cotton production and mill consumption[1] increased in the 2019 marketing year.[2] Production increases were mainly seen in India and the United States, while supply decreased in the People's Republic of China (hereafter "China"). Nonetheless, China remained the largest consumer, accounting for around one-third of total cotton mill use (see below). In recent years, strong growth of the spinning and textile industry has spurred the consumption of cotton in Bangladesh,[3] Turkey and Viet Nam, a trend that continued in the 2019 marketing year.

Estimated global stocks declined by 1% to 18.2 Mt, which amounts to about eight months of world consumption. Hitherto, changes in stocks have been determined by China, which currently holds 45% of global stocks. Since 2014 the country has sought to reduce its cotton stocks, and in 2019 these decreased by 7%. This decrease was largely offset by increasing stocks in Brazil, which enjoyed two good cotton crops in a row.

Global cotton trade remained at 9.3 Mt in 2019, or around one-third of global production. Export growth was registered for the United States (the world's main exporter), India, and Brazil, the latter increasingly supplying cotton to South and East Asia. By contrast, Australia's exports shrank markedly. On the demand side, imports decreased in China but increased in Viet Nam and Bangladesh.

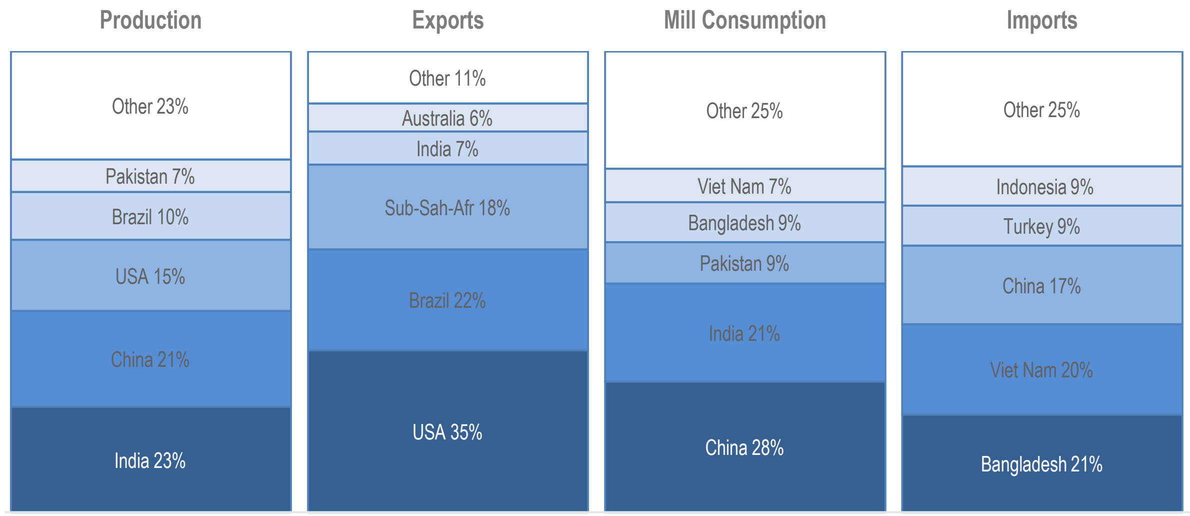
The Cotlook A index, the main reference for international cotton prices, is expected to decrease to an average of USD 1702/t for the 2019 marketing year, following the upward momentum that had been observed since August 2019. Cotton prices continue to be high compared to prices of polyester, the main substitute for cotton, and although the ratio of prices has stabilised in recent years it did increase in 2019.

10.2. Projection highlights

Driven by the assumption that the price ratio between cotton and other fibres will be more stable than in recent years, global mill consumption is expected to grow slightly faster than world population in the coming decade. The distribution of consumption across the globe depends on the location of cotton mills, which are often located in proximity to clothing and apparel industries. Over the past decades, there has been a marked shift in cotton mill activity from the developed world and the former Soviet Union towards Asia, especially China. Chinese consumption peaked in 2007 and has been declining since, as stricter regulations and rising labour costs have stimulated a move of the industry to other Asian countries, notably Viet Nam and Bangladesh. Since 2016, the decline in Chinese mill consumption seems to have ceased and the *Outlook* assumes a slight upward trend for the coming decade. In India, another major cotton consumer, government policies that support the domestic textile industry are expected to also stimulate continuous but slower growth in cotton mill use (slower than in the past decade).

World cotton production is projected to grow 1.5% p.a. to reach almost 30 Mt in 2029. This growth will come from an expansion of the cotton area (0.5% p.a.) as well as growth in average global yields (1% p.a.). Yields have been flat since 2004 as several countries struggled with pest problems and water scarcity, and because production shares of low-yielding countries have been increasing. Better genetics and the adoption of better agronomic practices for sustainable cotton production could bring improvement over the coming decade, but yield growth could remain a challenge in several countries. India will continue to be the world's largest cotton producer, but in line with recent trends cotton area expansion is expected to be limited. In general, the global players in cotton markets in 2029 will be the same as in the base period, which also means that Sub-Saharan Africa as a region is still expected to be the third largest exporter of raw cotton in 2029 (Figure 10.1).

Figure 10.1. Global players in cotton markets (2029)



Notes: Presented numbers refer to shares in world totals of the respective variable.
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142976

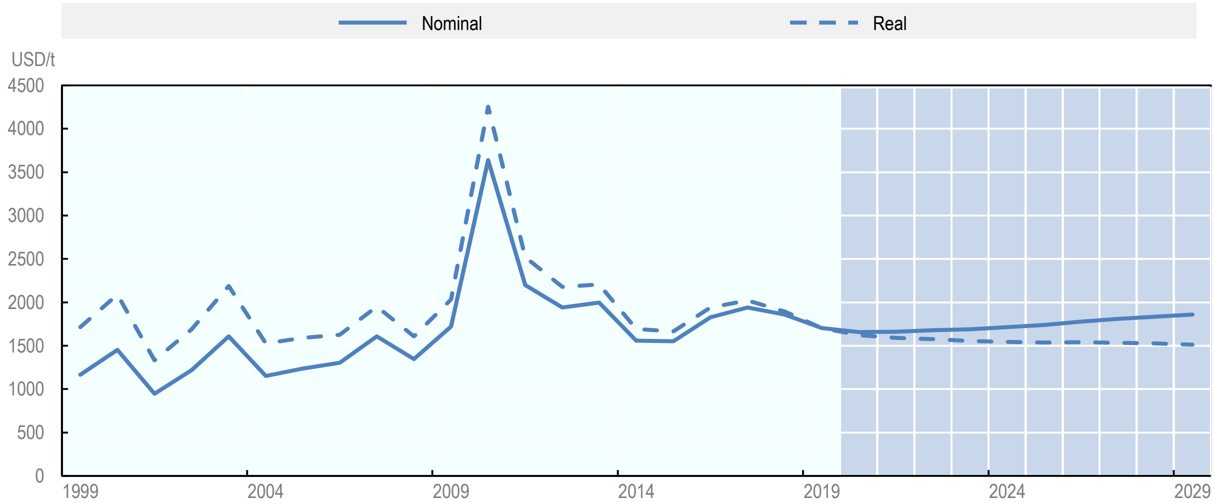
After trending downwards since 2017, global cotton prices are expected to increase over the projection period in nominal terms, while decreasing slightly in real terms. As the ratio between cotton and polyester prices appears to have stabilised and assuming China resumes its efforts towards a greener economy, polyester production should be dampened. This decrease in the rate of growth of polyester production and a slowdown in production growth in India should lead to increasing nominal cotton prices in the coming years.

Several uncertainties affect the outlook period under study, including the COVID-19 pandemic. In addition, it is unclear how per capita consumption of cotton textiles in developing and emerging economies will evolve as incomes grow and urbanisation continues, especially given competition from polyester. On the production side, projections are sensitive to pests and weather conditions. Climate change, with its impact on the occurrence and magnitude of events such as droughts and storms, constitutes an additional factor of uncertainty in the future. Sustainability considerations will continue to influence the future demand and supply of cotton. Trade tensions are another source of uncertainty for cotton markets.

10.3. Prices

International cotton prices are expected to decrease in real terms throughout the projection period, as world cotton demand remains under pressure from synthetic fibres, notably polyester. The decrease in real prices is equivalent to a slight increase in nominal terms. Since the early 1970s, when polyester became price-competitive with cotton, cotton prices have tended to follow polyester prices; on average. For example, cotton prices were only 5% above polyester staple fibre prices between 1972 and 2009. Since 2010, however, cotton prices have been on average almost 40% above the polyester price. This seems likely to be in large part due to temporary factors, including low production in 2015-16 and Chinese stockpiling. This *Outlook* expects a partial correction, bringing cotton prices closer in line with the historical pattern. Polyester prices themselves are not part of the outlook projections, but are expected to track oil prices, which are assumed to be flat in real terms.

Figure 10.2. World cotton prices



Note: The reference cotton price is the Cotlook price A index, Middling 1 1/8", CRF far Eastern ports. Data shown represent the marketing year average (August/July).
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934142995

The cotton market has historically been sensitive to external shocks that have led to large price swings. In 2010/11, cotton prices more than doubled due to a mix of high oil and polyester prices and an unexpectedly high demand (beginning of Chinese stockpiling and the additional demand resulting from the high polyester prices). The subsequent correction was only partial as both the additional demand from China and polyester prices progressively decreased (Chinese stockpiling progressively decreased until 2014 and polyester prices until 2015/16).

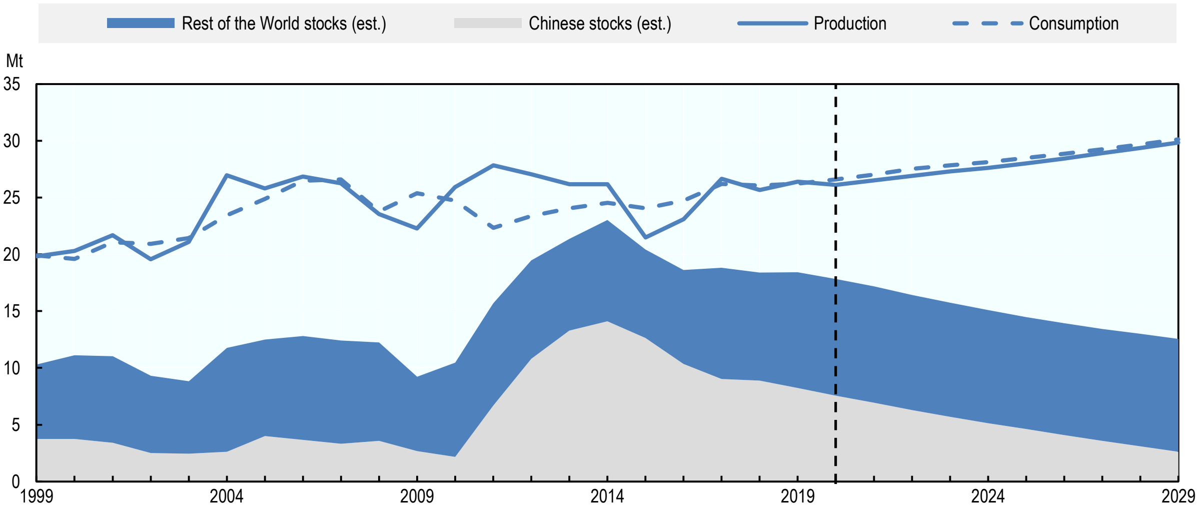
The potential for external shocks to create volatility still exists, but a repetition of the 2010/11 price peak seems unlikely given higher global stocks. However, decisions on destocking in China can affect the projections. This *Outlook* assumes that Chinese public stocks will gradually return to pre-2011 levels, in line with recent trends. The future path of cotton prices is clearly sensitive to this assumption.

10.4. Production

Cotton is grown in subtropical and seasonally dry tropical areas in both the northern and southern hemispheres, although most of the world's production takes place north of the equator. The main producing countries are India, China, United States, Brazil, and Pakistan. Together, these countries account for more than three-quarters of global production.

Most of the production growth in the coming decade is expected to come from these countries, with India accounting for more than a fifth of the increase. At the global level, the cotton area is projected to grow by 6% while yields are projected to increase by 7% compared to the base period. In the last decade, global yields were stagnant, reflecting stagnant yields in some major producers (United States, Pakistan, India), declining cotton area in China (where yields are well above average), and expanding cotton area in India (where yields are well below average). These factors are expected to continue to affect global yield trends in the coming decade, despite growth in both yields and cotton area in Brazil.

Figure 10.3. World cotton production, consumption, and stocks



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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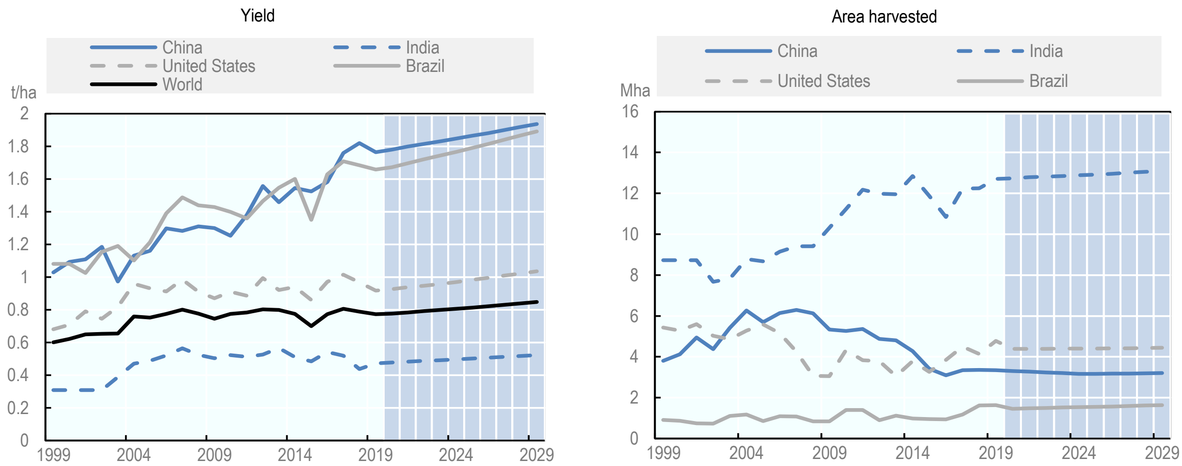
Production in India is projected to grow by around 1.3% p.a. over the coming decade due in large part to a growing demand for cotton for the domestic apparel industry. After a rapid increase in yields between 2000 and 2007 (linked to an increase in irrigation, fertiliser use, and the adoption of genetically modified Bt cotton), yields were stagnating in recent years as producers struggled with adverse weather and pests, such as the pink bollworm, which has become resistant to Bt cotton. While it is possible that new technologies will provide relief, the development and roll-out of solutions may take several years. In addition, cotton yields in India are influenced by the monsoon pattern in rain-fed regions and are hence vulnerable to climate change. This *Outlook* assumes that yield growth for Indian cotton will follow demand for cotton in the country while cotton area is projected to stay flat.

Figure 10.4. Cotton yields and area harvested in major producing countries



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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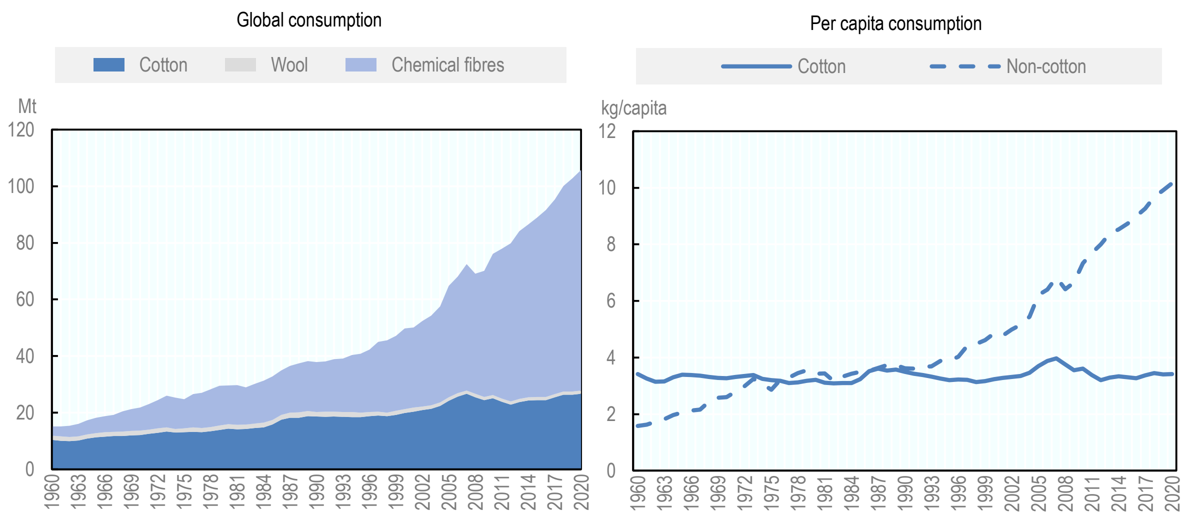
Chinese cotton producers currently achieve yields that are more than double the world average. Even though yields continue to be below the country's potential levels, since further improvement may become more difficult, yield growth is projected to slow down to 0.9% p.a. Although in general the cotton area in China has been declining over the past decade mostly due to changing government policies, this decline seems to have halted in the last two years. Nevertheless, this *Outlook* expects a slowly decreasing cotton area in China.

In Brazil, cotton is grown in part as a second crop in rotation with soybeans or maize, and output has recently grown strongly in the main growing areas, such as Mato Grosso. Favourable growing conditions and a high rate of adoption of modern technologies have driven rising cotton yields and areas over the past years. The *Outlook* assumes that these factors support further production growth.

10.5. Consumption

Cotton consumption statistics in this *Outlook* refer to the use of cotton fibres by mills for the production of yarn. This mill use depends on the global demand for textiles as well as on competition from substitutes such as polyester and other synthetic fibres. Over the past decades, global demand for textile fibres has grown strongly, but most of this demand has been met by synthetic fibres (Figure 10.5). Per capita consumption of non-cotton fibres overtook that of cotton in the early 1990s and has continued to grow strongly. By contrast, global per capita consumption of cotton fibres has not increased much over time and has even decreased in recent years. As a result, global cotton consumption peaked in 2007 at 27 Mt, but decreased to around 26 Mt in 2017-19.

Figure 10.5. Historical trends in consumption of textile fibres



Source: ICAC World Textile Demand estimates, 2020.

StatLink https://doi.org/10.1787/888934143052

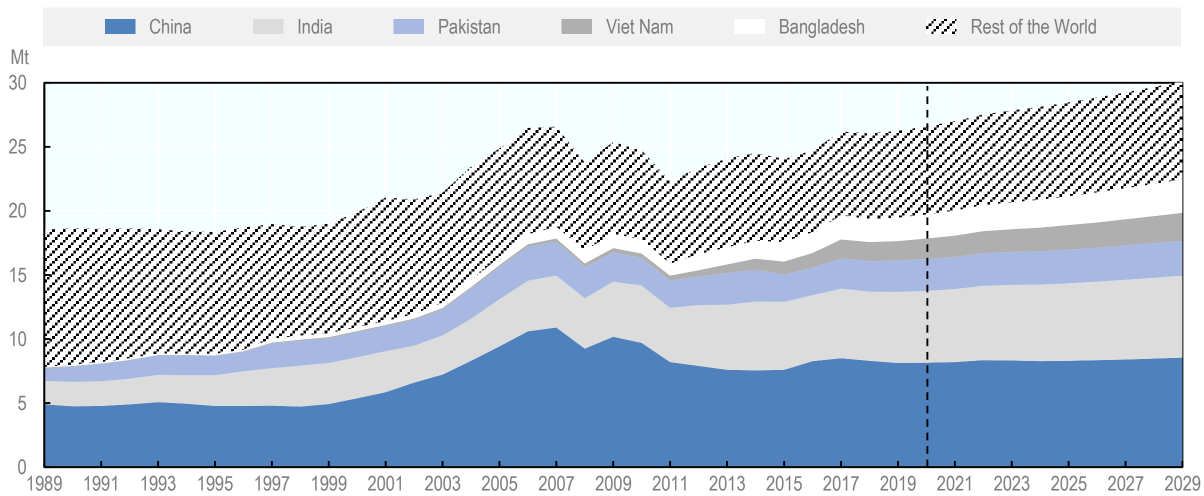
The prospects for global cotton use depend on developments in developing and emerging economies. Data collected by the International Cotton Advisory Committee (ICAC) suggests that global per capita demand for cotton products decreased between 2007 and 2012 but since then global per capita demand has slightly increased (Figure 10.5). The effects of income growth should lead to a higher demand for cotton products. However, strong population growth in regions where per capita demand for cotton products is below average dampens this effect. On the other hand, demand from developing regions with lower absolute levels of consumption but higher income responsiveness will put an upwards trend on global demand as both, incomes and population in these countries are projected to rise. As a result, this *Outlook* expects that global consumption of cotton products will grow at a slightly higher pace than global population in the coming decade. Correspondingly, global mill use is projected to grow by around 1.3% p.a. over the outlook period.

The distribution of demand for cotton fibres depends on the location of spinning mills, where cotton and synthetic fibres are spun into yarn. The greatest amount of yarn spinning occurs in countries where downstream industries are located, mostly in Asian countries with lower labour costs. China has been the world's largest consumer of cotton since the 1960s. Major shifts are taking place, however, with yarn production gradually moving from China to other Asian countries.

From its peak in 2007, China's consumption has fallen since by 25%. This decline has been partly due to a decrease in government purchases of cotton, which had provided higher prices to farmers but also induced a shift from cotton to synthetic fibres on the demand side. The decline also reflects structural change as higher labour costs and more stringent labour- and environmental regulations stimulated a move of the industry to other Asian countries, notably Viet Nam and Bangladesh. In the last four years, mill consumption has regained some lost ground, in part because cotton prices have become more competitive when compared to polyester. Polyester also appears to have suffered a setback due to government measures to combat industrial pollution. Chinese spinning mill use is therefore assumed to continue at similar levels as seen today over the next decade.

By contrast, spinning mill use is expected to grow in India as the government favours the development of the domestic textile industry. Textiles form an important component of Indian industrial production and are considered an engine of employment generation. Policies are expected to continue supporting its development, e.g. through support for the adoption of faster looms.

Figure 10.6. Cotton mill consumption by region



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en ; historical data from ICAC.

StatLink https://doi.org/10.1787/888934143071

The phase-out in 2005 of the Multi Fibre Arrangement (which had fixed bilateral quotas for developing country imports into Europe and the United States) was expected to favour Chinese textile producers at the cost of smaller Asian countries. In practice, countries such as Bangladesh, Viet Nam and Indonesia experienced strong growth in their textile industry. In the case of Viet Nam, this was partly driven by foreign direct investment (FDI) of Chinese entrepreneurs and its accession to the World Trade Organization in 2007. The rapid growth in these countries is expected to continue over the next decade, with Bangladesh and Viet Nam expanding their mill use by about 45% and Indonesia by more than 30% relative to the base period. Further growth is also expected in Turkey and Central Asia, where the textile industry is expanding in part thanks to growing exports to the European Union and the Russian Federation.

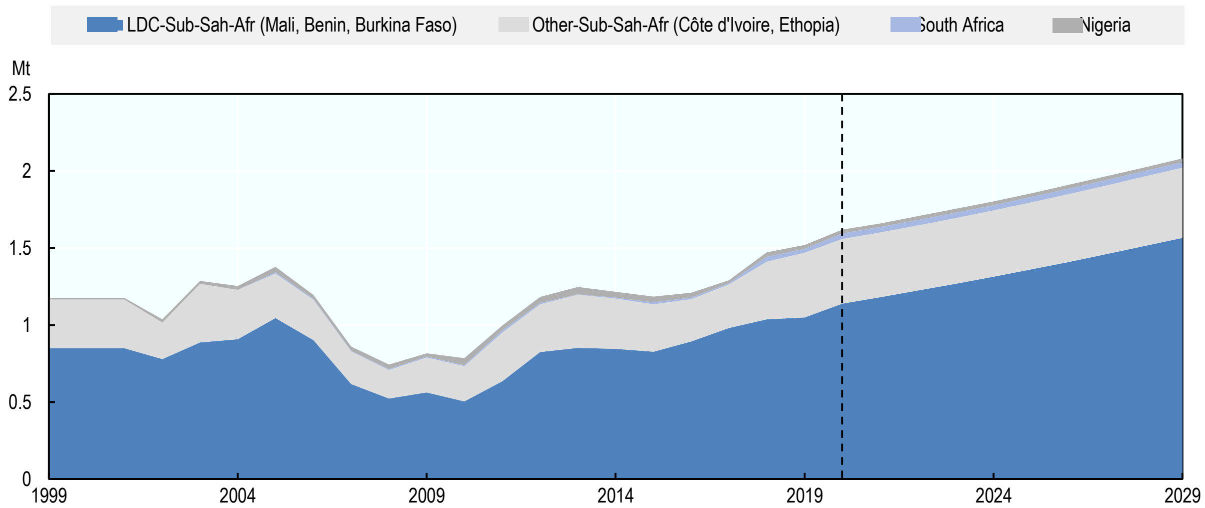
10.6. Trade

Cotton has historically been traded in bales of raw cotton fibres, although trade in cotton yarn has been growing recently. The global trade in raw cotton (the focus in this *Outlook*) is projected to surpass 11 Mt in 2029, 23% higher than during the base period. Trade is therefore expected to grow slightly faster than overall consumption given the demand growth in countries without much domestic cotton production, such as Bangladesh and Viet Nam, and stagnating domestic mill use in Brazil.

Bangladesh and Viet Nam are expected to be the leading importers over the next decade. By 2029, both countries are projected to increase imports by more than 43%. Together, they will account for over 40% of global imports (Figure 10.1). The United States will remain the world's largest exporter throughout the outlook period, accounting for more than one third of global exports in 2029. Brazilian exports are expected to grow strongly over the next decade as Brazil emerges as the second-largest exporter by 2029.

Cotton is an important export crop for Sub-Saharan Africa, which currently accounts for 15% of global exports (with West Africa accounting for almost 75% of the region's production and shipments). Burkina Faso, Benin, Mali, and Côte d'Ivoire, the leading producing countries, have seen their volumes expanding due to area expansion and government support. Spinning mill consumption remains limited throughout Sub-Saharan Africa and many countries export virtually all of their production. However, the apparel manufacturing industry has started to develop in some countries of East Africa, especially Ethiopia, as the region presents some attractive conditions for FDI. In the long run, this might change the net export condition of Sub-Saharan Africa that has been observed in the past. Nonetheless, Sub-Saharan African exports are projected to continue growing at around 2.9% p.a. in the coming decade, increasing the region's market share to 18%, with Asia and Southeast Asia being the major destinations for shipments.

Figure 10.7. Cotton exports in Sub-Saharan Africa



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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10.7. Main issues and uncertainties

As discussed above, economic growth and urbanisation will affect the per capita demand for cotton textiles in developing and emerging economies. Since the consumption of textiles and apparel is more income responsive than the consumption of food commodities, deviations from the economic conditions assumed for the developing world could lead to important changes in global consumption, production and trade projections.

Such a situation is observed with the current COVID-19 pandemic where economic conditions and consumer behaviour have changed abruptly as a result of the confinement policies all around the world to reduce the spread of the virus. The decrease in the demand for textiles and apparels forced producers to cut their demand for fibre products, essentially yarns and fabrics. In turn, cotton mills have slashed their demand for cotton, leading to a significant fall in international prices. For the current 2019/20 season, cotton crops in the major producing areas have already been harvested. However, the current depressed cotton prices will have a determining role in farmers' planting decisions, affecting the production of the next season. An expansion of the COVID-19 measures could also affect the labour-intensive planting operations in West Africa, which typically begin in May.

Other demand trends could also affect the projections. For instance, recycling by the textile industry is creating a steady secondary market that competes to provide raw material to producers of lower-quality textiles and non-textile products. This trend could further reduce the demand for cotton and other fibres. However, in high-income countries there appears to be an increasing consumer preference for natural fibres that could favour cotton over polyester.

Policy measures can also affect consumption trends. For instance, several East African countries are moving towards discouraging second-hand clothing imports, which could give a push to cotton consumption and encourage value addition in Africa.

Cotton production is sensitive to pests and weather conditions. Given cotton's dependence on water, projections are sensitive to climate change, which could lead to droughts and other adverse weather conditions. As noted above, yield growth has been slow in several countries in the past decade. Faster than expected improvements in genetics (e.g. facilitated in part by a better understanding of the cotton genome) and better pest management have the potential to lead to higher yield growth than what is expected in this *Outlook*. However, such innovations take time to develop and deploy, and in the case of genetically modified cotton, are sometimes controversial. In India, pink bollworm appears to have become resistant to Bt cotton, resulting in significant crop losses. In Burkina Faso, the introduction of Bt cotton in 2008 was effective in combatting bollworms, but resulted in a shorter staple length (and hence lower quality premiums). This prompted the government to phase out Bt cotton in 2015.

Policies play an important role in global cotton markets. This is notably the case for Chinese stockholding policies. Other policy initiatives (e.g. support for domestic textile industries, input subsidies) may also affect projections.

Sustainability considerations will continue to influence the future demand and supply of cotton. Globally, an estimated 19% of cotton was produced under the sustainability standards of the Better Cotton Initiative in 2017-18 and further growth is expected. Related segments, such as organic cotton, are also expected to grow. One implication of these trends is an increased need for transparency and traceability along the supply chain.

Notes

[1] Consumption data in the *Outlook* refer to cotton mill use, i.e. the processing of raw cotton into yarn.

2 In line with the convention used by the International Cotton Advisory Committee, the marketing year for cotton is defined as running from 1 August to 31 July. Data for 2019 thus refer to the period from 1 August 2019 to 31 July 2020 and are forecasts based on available data.

3 The *Outlook* reports data for least-developed countries in Asia as a single aggregate, which in addition to Bangladesh includes Afghanistan, Bhutan, Cambodia, East Timor, Laos, Myanmar, and Nepal. For cotton, Bangladesh accounts for nearly all the activity in this aggregate. For simplicity, this chapter therefore describes the data as referring to Bangladesh only.

11. Other products

This chapter provides a market overview and a description of the current market situation for roots and tubers (i.e. cassava, potato, yams, sweet potato, taro), pulses (i.e. field peas, broad beans, chickpeas, lentils), and banana and major tropical fruits (i.e. mango, mangosteen and guava, pineapple, avocado, and papaya) markets. It then highlights the medium term (2020-29) projections for production, consumption and trade for these products and describes the main drivers of these projections.

11.1. Roots and tubers

Market overview

Roots and tubers are plants that yield starch, either derived from their roots (e.g. cassava, sweet potato and yams) or stems (e.g. potatoes and taro). They are destined mainly for human consumption (as such or in processed form) and, like most other staple crops, they can also be used for animal feed or industrial processing, notably for manufacturing starch, alcohol, and fermented beverages. Unless they are processed, they are highly perishable once harvested, which limits opportunities for trade and storage.

Within the roots and tubers family, potato dominates in worldwide production, with cassava a distant second. Regarding global dietary importance, potato ranks fourth after maize, wheat and rice. The crop provides more calories, grows more quickly using less land and can be cultivated in a broader range of climates than any other staple food crop. However, the dominant position of potatoes is increasingly being eroded by cassava. In fact, potato production, which forms the bulk of the root and tuber sectors in developed countries, has seen a long-standing decline for several decades with growth in production falling well below that of population.

Output of cassava is currently growing at well over 3% p.a., almost three times the rate of population growth. Cultivated mainly in the tropical belt and in some of the world's poorest regions, cassava production has doubled in a little over two decades. Once considered a subsistence crop, cassava is now seen as a commodity and key for value-addition, rural development and poverty alleviation, food security, energy security and for bringing about important macroeconomic benefits. These factors are driving the rapid commercialisation and large-scale investments in upscaling the processing of cassava which have contributed significantly to the global expansion of the crop.

Current market situation

The largest producing regions of roots and tubers today are Asia (95 Mt) and Africa (90 Mt). Particularly in Sub Saharan Africa, roots play a significant role as a staple crop. Globally, about 124 Mt are used as food, 55 Mt as feed and 55 Mt for other uses, mostly biofuel and starch. As the perishable nature of the crops prohibits significant international trade in fresh produce, countries tend to be self-sufficient. About 14 Mt are currently traded internationally, mostly in processed or dried form. Thailand and Viet Nam are the leading exporters and the People's Republic of China (hereafter "China") is the main destination of their shipments.

In 2019, global production of roots and tubers reached 237 Mt (dry matter), 3 Mt more than in 2018. These additional quantities were mainly consumed as food. Roots and tubers prices (measured by the Cassava (flour) wholesale price in Thailand, Bangkok) was weaker in 2019 as yields in many major producing regions were favourable. As a consequence, global quantities traded also increased by 0.5 Mt.

Main drivers for projections

Producing cassava requires few inputs and affords farmers great flexibility in terms of timing the harvest, as the crop can be left in the ground well after reaching maturation. Cassava's tolerance to erratic weather conditions, including drought, makes it an important part of climate change adaptation strategies. Compared with other staples, cassava competes favourably in terms of price and diversity of uses. In the form of High Quality Cassava Flour (HQCF), cassava is increasingly being targeted by governments in Africa as a strategic food crop which does not exhibit the same levels of price volatility as other imported cereals. Mandatory blending with wheat flour helps to reduce the volume of wheat imports, therefore lowering import bills and conserving precious foreign exchange. The drive towards energy security in Asia, combined with mandatory blending requirements with gasoline, has led to the establishment of ethanol distilleries that use cassava as a feedstock. With regard to trade, processed cassava manages to compete successfully on the global arena, such as with maize-based starch and cereals for animal feeding applications.

Potatoes are mostly confined to food use and are a substantial component of diets of developed regions, particularly Europe and North America. As overall food intake of potato in these regions is very high and may have reached saturation, the scope for consumption increases to outpace population growth remains limited in that part of the world. Rising food use in developing regions, provides some growth momentum to potato production at the world level.

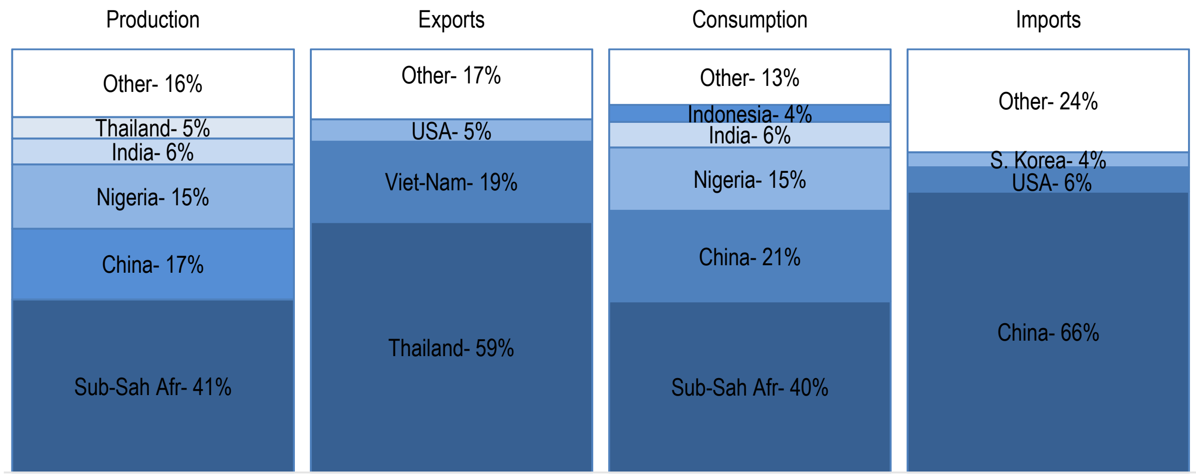
Global sweet potato cultivation has declined in recent years, mostly due to a sharp acreage decline (which shows no sign of abating), in China – the world's foremost producer. Food demand largely defines the growth potential of sweet potato and other less prominent roots and tuber crops given the limited commercial viability for diversified usage. Consequently, consumer preferences along with prices play important roles in shaping consumption.

Projection highlights

World production and utilisation of roots and tubers is projected to expand by about 18% over the next decade. Growth in low-income regions could reach 1.7% p.a. while a slight annual reduction is expected in industrialised countries. Global land use is projected to increase slightly to 71 Mha, but there will be some regional shifts. African countries are expected to increase their cultivation, while some reductions are projected in Europe and America. Production growth is mainly attributed to investments into yield improvements in Africa and Asia as well as an intensification of land use in these regions.

By 2029, an additional 1.5 kg/capita per year of root crops will enter global diets, driven mostly by consumers in Africa where per capita intake of roots and tubers could surpass 41 kg per year. Biofuel use, albeit from a low basis (2% of use), is expected to double over the next ten years driven by the Chinese biofuel industry. Feed and other industrial use will remain significant, albeit seeing slower growth of only about 10% over the decade.

Figure 11.1. Global players in roots and tubers markets (2029)



Notes: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934143109

International trade in roots and tubers only comprises around 6% of the global market. Over the medium term, this share is expected to remain constant. Exports from Thailand and Viet Nam are growing and are expected to reach a combined 13 Mt, mainly to supply the growing biofuel and starch industries in China.

Given the substitutability between roots and tubers and cereals on food and feed markets, the roots and tubers prices are projected to follow a similar path to cereal prices: namely, an increase in nominal prices but a decline in real terms

11.2. Pulses

Market overview

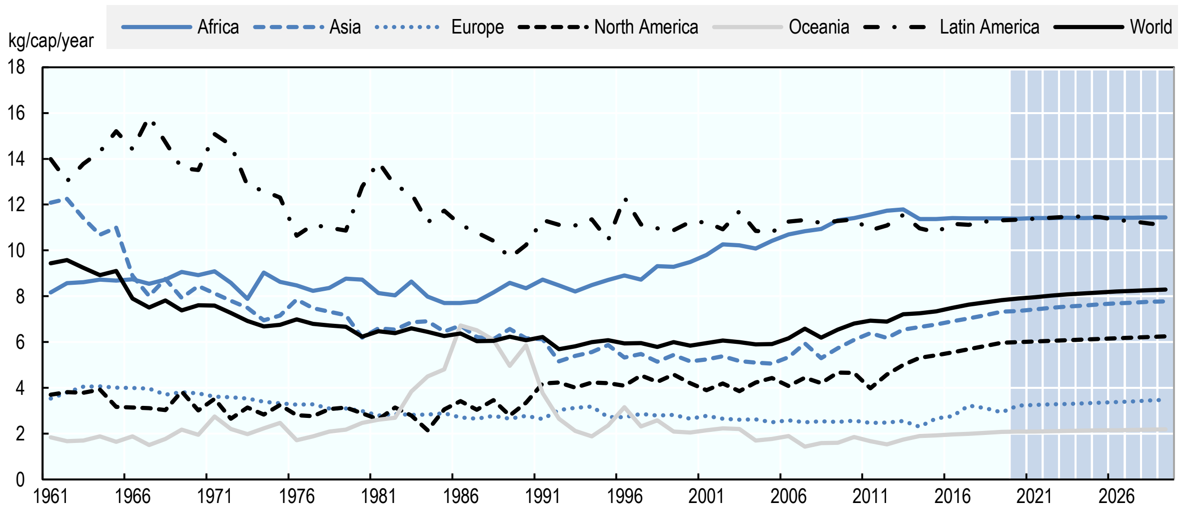
Pulses are the edible seeds of plants in the legume family. Commonly, eleven types are recognised.[1] They provide protein, dietary fibre, vitamins, minerals, phytochemicals and complex carbohydrates. Apart from the nutritional benefits, pulses also assist in improving digestion, reducing blood glucose, minimising inflammation, lowering blood cholesterol, and preventing chronic health issues such as diabetes, heart diseases and obesity. However, their consumption levels differ from region to region depending on the dietary patterns, availability and prevailing conditions.

Cultivation of pulses has a long tradition in almost all regions of the world. For centuries, legumes have played a fundamental role in the functioning of traditional agricultural systems. Before 2000, global production of pulses stagnated due to the widespread disappearance of small farms in developing countries, resulting in a decline of traditional farming systems that included pulses in their crop rotation. Production was further hampered by low resilience to diseases because of low genetic diversity, limited access to high-yield varieties and the lack of policy support to pulses growers. When demand started to pick up again in the early 2000s, the sector began to recover and has since seen an annual increase of about 3% globally, led by Asia and Africa. Combined, these two regions accounted for about 64% of the 19 Mt production increase during the previous decade.

Global per capita consumption of pulses started to decline in the 1960s (Figure 11.2). Slow growth in yields and the resulting rise in prices weakened demand. Furthermore, income growth and urbanisation shifted preferences away from pulses as human diets became richer in animal proteins, sugar and fats. Nonetheless, pulses have remained an important source of protein in developing countries and average global per capita consumption increased to about 8 kg/year by today. This growth was mainly driven by income gains in countries were pulses are an important source of protein, most of all India, were vegetarians account for about 30% of the population.

Pulses can be processed into different forms such as whole pulses, split pulses, pulse flours and pulse fractions like protein, starch and fibre. The flour and fractions find diverse applications in industries like meat and snack food, bakery and beverages, and batter and breading.

Figure 11.2. Per capita food consumption of pulses per continent



Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://doi.org/10.1787/888934143128

Current market conditions

India is by far the largest producer of pulses accounting for about 25% of global production during the past decade. Canada (8%) and the European Union (4%) are the next largest producing countries. The Asian market accounts for more than half of all consumption, but only about 40% of the production, making it the most significant import destination. About 20% of global production is traded internationally and Canada (40% of global trade) is the by far largest exporter and India the largest importer (30% of global trade). Africa has further expanded its production and consumption during the past decade, remaining largely self-sufficient.

In 2019, the global pulses market reached a volume of 88 Mt, after an average annual growth of 2.8% p.a. during the previous decade led by Asia and Africa. Growth between 2018 and 2919 has been especially high in the European Union (+10%). World trade registered at 17 Mt, 0.5 Mt higher than in 2018. Due to an ample supply situation, international prices for pulses, approximated by the Canadian field pea price, have dropped to USD 320/Mt, the lowest value since 2017.

Main drivers for projections

As pulses are associated with various health benefits, health-conscious consumers are increasingly incorporating dishes made from pulses into their everyday diets, in turn, propelling the growth of the global pulses market. As a result of rapid urbanisation, changing lifestyle and hectic work schedules, healthy snack foods are becoming popular amongst the working population. Pulses are increasingly being used in the processing of those ready-to-eat (RTE) food products.

As the global population is rapidly increasing, the gap between the demand and supply of pulses is widening. In order to minimise this difference, the governments of pulses-producing countries are providing assistance to the farmers, in turn, strengthening the growth of the market. Support to pulses production plays also an important role in the Protein Strategy of the European Union. Pulses are also the major basis of booming products like artificial meat. Depending on the future dynamics of demand for such products, this could significantly change the future importance of pulses in the agricultural production mix.

Projection highlights

Pulses are expected to regain importance in the diets and farming systems of Africa, Asia and Latin America and also the European Union. The *Outlook* foresees the global trend to continue and expects global average per capita food use to increase to 8.3 kg in 2029. Per capita consumption is projected to level off in Latin America and Africa, at just above 11 kg/year, while in Asia it is expected to increase from 7 kg to 8 kg per year over the coming decade.

Global supply is projected to grow by another 16 Mt. More than half of this increase is expected to come from Asia, particularly India, the world's largest producer. Sustained yield improvements are expected to raise India's domestic production by an additional 5.8 Mt to 2029. India has now introduced high-yielding hybrid seeds, has supported mechanisation, and has implemented a minimum support price aimed at stabilising farmers' income. In addition, the central government and some state governments have included pulses in their procurement programmes, although not with the same geographical coverage as in the case of wheat and rice.

This expected production expansion is driven by the assumption of continued intensification of the pulses production systems, due to improved yields and intensified land use. About 80% of the production growth can be attributed to yield improvements; the remaining 20% is due to land use intensification, mainly in Asia and Africa. Particularly in Africa, a combination of area expansion and yield growth is estimated to add about 0.2 Mt annually to the regional production.

The *Outlook* assumes that growth will be sustained by increased intercropping of pulses with cereals, in particular in Asia and Africa, where smallholder farmers represent a large share of producers. The projected yield improvements of pulses will still lag behind cereals and oilseeds, because in most countries pulses are not included in the development of high-yielding varieties, improved irrigation systems and agricultural support policies.

As a result of increasing demand for pulses in consuming regions, world trade grew from 11 Mt to 17 Mt over the past decade and is projected to remain at this level up to 2029. India's recent efforts to become self-sufficient in pulses are the major factor driving the anticipated restructuring of global pulses trade where Africa will become the main importing region. After a continued increase in imports in the near term, India is expected to experience a reversal in this trend by 2025, reducing its import by about 1 Mt by 2029.

Canada remains the main exporter of pulses, with volumes expected to grow from 6.5 Mt currently to 7.5 Mt in 2029, followed by Australia with 2 Mt of exports in 2029. However, since their major trading partner India is not expected to increase imports, they need to diversify its export markets.

Sustained by increasing demand for pulses, international prices are expected to increase in nominal terms over the coming decade while real prices will decline slightly.

11.3. Bananas and major tropical fruits

Bananas rank as a leading crop in world agricultural production and trade. In response to fast population growth in producing countries as well as rapidly expanding global import demand, bananas have experienced a rapid increase in production and trade volumes in recent decades. Moreover, export volumes of the four major fresh tropical fruits – mango, pineapple, avocado and papaya – have experienced some of the fastest average annual growth rates among internationally traded food commodities, significantly outpacing growth in exports of cereals, livestock products, vegetable oils, sugar, and other fruits and vegetables. Bananas and major tropical fruits play a vital role in the nutrition and livelihood of smallholders in producing countries. For all these underlying reasons, it is important to assess the potential future market development of these agricultural commodities.

Global banana production is estimated to have grown from 69 Mt in 2000-2002 to 116 Mt in 2017-2019 (an approximate value of USD 31 billion). Since the bulk of banana cultivation is conducted informally by smallholder farmers, these figures are only estimates. To satisfy a growing demand, producing countries have mainly relied on an expansion in the harvested area. In India, for instance, the harvested area for banana crops has increased from 0.47 Mha in 2000 to 0.87 Mha in 2018. Improved productivity at the farm level involving better irrigation systems but also a substantially higher application of fertilisers and pesticides have also contributed to this increase in banana output. The main driver of the expansion in production has been the increasing consumption requirements of rising populations in producing countries. Accordingly, most of the global increase in production has taken place in the top producing countries that are also top consumers, in particular in India and China, but also in Brazil and the Philippines. In addition, income growth and a rising health awareness in import markets have also contributed to higher demand, with banana consumption having substantially risen in the European Union and the Russian Federation, for example.

In many producing regions, per capita consumption of all types of bananas well exceeds 100 kg per year. Available data also suggest that bananas provide up to 25% of the daily calorie intake in the rural areas of producing countries. More than 1 000 varieties of bananas are reportedly produced and consumed locally in the world. In Africa, the third largest producing region of bananas globally, some 70%-80% of production are local varieties, mostly cooking bananas that importantly contribute to food security in the region. However, due to the informality of production and trade in most consuming regions, data and information on these local varieties remain largely unavailable. The most commercialised banana variety is the Cavendish type, which is estimated to account for around 40%-50% of global production and for virtually all trade. This variety is able to achieve high yields per hectare and, due to its short stems, is less prone to damage from adverse weather events such as storms. Cavendish banana plantations are also able to recover quickly from natural disasters given the short time this variety needs to reach maturity (approximately nine months).

Based on 2017 figures, the global banana export industry generates around USD 12 billion per year. However, it is important to note that only around 15% of global banana production is traded in international markets. In exporting countries, which are mostly low-income economies, revenue from banana production and trade can weigh substantially in agricultural GDP. For instance, banana (export) revenue represented about 30% of agricultural export revenue in Ecuador in 2018, and 15% in Guatemala.

Global production of tropical fruits has been growing steadily over the past decade. An estimated 99% of tropical fruit production originates from low-income countries, mostly cultivated at subsistence rather than at commercial level by smallholder farmers who typically are endowed with, or have access to, less than 5 ha of land. As such, tropical fruits contribute directly and importantly to food security and nutrition in most producing zones. The growth in global production of tropical fruits over the outlook period is assumed to be mainly driven by area expansion, supported by higher per hectare returns compared to competing crops. Due to rising incomes in key producing and importing regions, the role of tropical fruits in nutrition has made significant advancements over the past decade, as reflected by the rising world per capita consumption of all four major tropical fruits. However, given the high perishability of tropical fruits, especially those that are harvested when ripe, only a small fraction of total tropical fruit production is traded in national markets, and an even smaller one in international markets. While unprocessed, fresh or dried tropical fruits occupy a comparatively niche position in global agricultural trade in volume terms, their high average export unit value in excess of USD 1 000 per tonne places them as the third most valuable fruit group globally, behind bananas and apples. As such, trade in tropical fruits has the potential to generate significant export earnings in producing countries. Income growth and changing consumer preferences in both emerging and high-income markets will act as the main factors facilitating growth in trade, alongside improvements in transport and supply chain management. Under these assumptions, the projections indicate that tropical fruits will continue to be among the fastest growing agricultural sectors.

Bananas

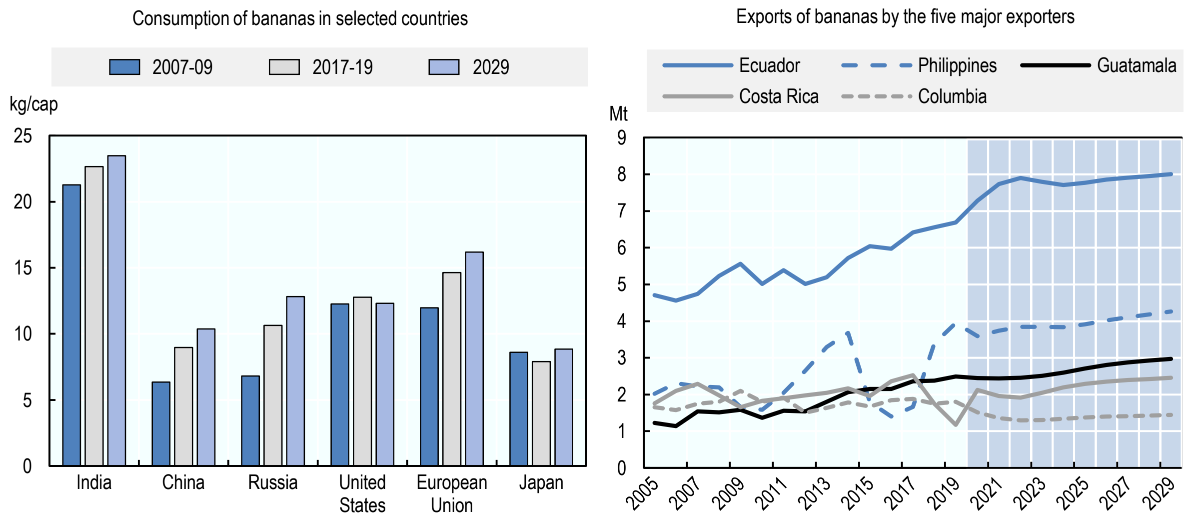
Market situation

Global exports of bananas, excluding plantain, are estimated to have reached a new record high of 20.2 Mt in 2019, an increase of 5% compared to 2018. Data from the first nine months of the year indicate that strong supply growth in Ecuador and the Philippines, the two leading exporters, is again chiefly accountable for this rise. Adverse weather conditions attributed to the *El Niño* weather phenomenon, meanwhile, have continued to affect shipments from several key suppliers, most severely from Costa Rica and the Dominican Republic, and to a lesser extent from Colombia. Global net import volumes of bananas are estimated to have reached 18.9 Mt in 2019, an increase of 3% compared to 2018. Preliminary data indicate a contraction in imports of, respectively, 1% and 4% in the two largest net importers, the European Union and the United States. Conditions of supply outstripping demand continued to put downward pressure on prices in both destinations in 2019, particularly during the summer months, when competition from temperate fruits was strong. Imports by China, meanwhile, are estimated to have reached 2.2 Mt, an expansion of 36% compared to 2018. Chinese import demand for bananas continued to be driven by weather- and disease-related disruptions to domestic production as well as by fast income growth and associated changes in consumer preferences. As a result, China expanded its volume share to an estimated 12% of global net imports, overtaking the Russian Federation as the third largest importer of bananas globally.

Projection highlights

Assuming average weather conditions and no further spread of banana plant diseases, the *Outlook* projects world production of bananas to grow at 1.5% p.a., to reach 132.6 Mt in 2029. Demand for bananas is expected to become saturated in most regions and primarily driven by population growth. However, in some emerging economies – principally in India and China – fast income growth is anticipated to stimulate changing health and nutrition perceptions and support growth in demand for bananas beyond population growth. Accordingly, Asia is expected to remain the leading global producer, with a global volume share of 51.8%. India, in particular, is projected to reach 35.5 Mt of banana production in 2029 and a per capita consumption of 23.5 kg. Production from the leading exporting region – Latin America and the Caribbean – is expected to reach 34.8 Mt, encouraged by rising demand from key importing markets, most importantly the European Union, the United States and the Russian Federation. The largest exporters in Latin America and the Caribbean (Ecuador, Guatemala, Colombia, and Costa Rica) should benefit from this rise in import demand, assuming that production growth can be shielded from the adverse effects of weather events and disease outbreaks. Exports from the Philippines are expected to be mainly driven by burgeoning import demand from China, where per capita consumption is expected to rise by 1.1% p.a., as well as sustained income-driven demand from Japan, the primary export destination for Philippine bananas. Successful disease management and ample investments into yield improvements and area expansion are expected to support export growth in the Philippines on the supply side. As such, the Philippines is set to expand its volume share in global banana exports from 15.6% in the base period to 18.6% in 2029, thereby consolidating its position as the second largest exporter behind Ecuador. Among the key import markets, the largest increase in per capita consumption is expected to be seen in the Russian Federation, from 10.7 kg in the base period to 12.8 kg in 2029, based on positive macroeconomic developments. This is expected to support export growth from Ecuador, currently the main supplier of bananas to the Russian Federation. Facilitated by investments in yield improvements, Ecuador is projected to expand its share of global exports by one percentage point over the outlook period, to 35% in 2029 or 8 Mt.

Figure 11.3. World banana outlook



Source: FAO (2020).

StatLink https://doi.org/10.1787/888934143147

Mango, mangosteen and guava

Market situation

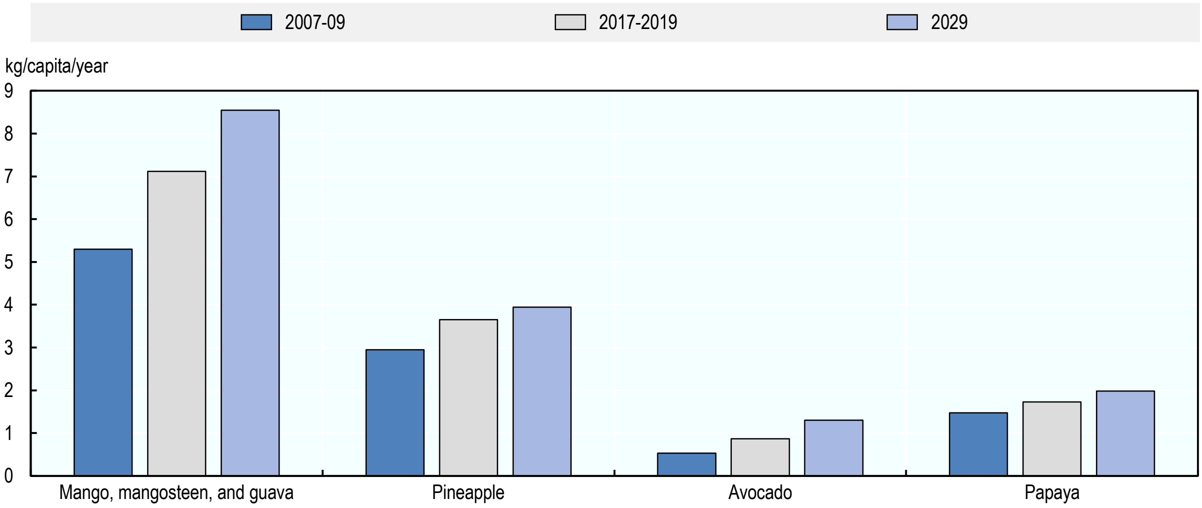
Global exports of fresh mangoes, mangosteens, and guavas[2] are estimated to have grown to 2 Mt in 2019, an increase of 23% from the previous year. This places the commodity cluster as the fastest growing group among the major tropical fruits in 2019. The main driver is a near 90% expansion in exports from Thailand, which reached an estimated 0.48 Mt in 2019. Exports from Thailand benefited from exceptionally fast growth in import demand for mangosteen from China, with shipments increasing by a reported 265% year-on-year between January and October 2019, to 0,29 Mt. Rising incomes and changing consumer preferences in China can be considered as the main drivers of this expansion, with mangosteen being particularly sought after due to the fruit's assumed health benefits. With an average export unit value of USD 1 300 per tonne for shipments from Thailand to China during the first ten months of 2019, mangosteens are among the most valuable tropical fruits traded.

Projection highlights

Global production of mangoes, mangosteens and guavas is projected to reach 72.8 Mt by 2029, increasing at 2.9% p.a. over the next decade. Asia, the native region of mangoes and mangosteen, is expected to account for 71% of global production in 2029. Average per capita consumption in Asia is expected to reach 12.1 kg in 2029, compared to 9.8 kg in the base period. Income growth and associated shifts in dietary preferences in the two main consuming countries, India and China, will be the main drivers. The two countries are expected to experience increases in per capita consumption of 2% to 3% p.a. over the outlook period, reaching 17.6 kg and 4.3 kg in 2029, respectively. Mango production in India is destined largely for local informal markets and is projected to account for 26.7 Mt in 2029, or 36.6% of global production. China, whose domestic mango production is comparatively low at a projected 5.8 Mt in 2029, is expected to experience a growth in imports of 5.1% p.a. This is mainly due to a strong increase in demand for mangosteen. Chinese demand for mangosteen is expected to be predominantly met by an increase in imports from Thailand, the largest global exporter of mangosteen. Mexico, the leading supplier of mangoes globally, is expected to benefit from further growth in import demand from its major market, the United

States, and register 4% p.a. growth over the outlook period, to reach a 25.7% share of world exports in 2029.

Figure 11.4. World consumption of major tropical fruits



Source: FAO (2020).

StatLink https://doi.org/10.1787/888934143166

Pineapple

Market situation

Ample supplies led to an estimated rise in global exports of fresh pineapples of 5%, to 3.2 Mt in 2019. This expansion is mainly due to a 50% increase in exports from the Philippines, the second largest world exporter. Following substantial investments in area expansion and productivity, exports from the Philippines reached an estimated 0.67 Mt in 2019, representing about 21% of world exports. Data available until September 2019 indicate that, in addition to higher supplies, exports of pineapples from the Philippines benefited from a strong increase in import demand from China, reaching 0.17 Mt in January-September 2019, a 122% increase on the year. Filipino pineapples of the MD2 variety are well received by the Chinese market due to their high brix levels and the fact that supplies are available year round, while domestic Chinese production is largely restricted to the harvesting period between March and May. Exports from Costa Rica, the world's largest producer and exporter of pineapples, meanwhile, were substantially hindered by excessive rainfall throughout the year as well as destructive tropical storms in the fall of 2019. Overall, shipments from Costa Rica are anticipated to decline by approximately 8%, from 2.1 Mt in 2018 to slightly below 2 Mt in 2019.

Projection highlights

On account of a 2% expansion in harvested area, global production of pineapple is projected to grow at 2.3% p.a., to reach 33 Mt in 2029. Among the major tropical fruits, pineapple is the least concentrated in terms of geographic distribution, with no single country producing more than 12% of global output. Asia is expected to remain the largest producing region, and account for 41% of global production; pineapple production being sizeable in the Philippines, Thailand, India, Indonesia and China. Only the Philippines exports approximately 16% of its production, otherwise pineapple cultivation in Asia predominantly caters to domestic demand and is expected to grow in response to changing demographics and income growth. Similarly, pineapple production in Latin America and the Caribbean, the second largest producing region accounting for 36% of world production, will be primarily driven by the evolving consumption needs of the region's growing and increasingly affluent population. Global exports of pineapple are expected to grow at 1.5% p.a., to 3.6 Mt in 2029, predominantly driven by import demand from the United States. With projected imports of 1.3 Mt in 2029– equivalent to a 35% global share – the country is expected to remain the largest importer, ahead of the European Union, which is expected to account for 28% of global imports. In both key import markets, demand for pineapples is expected to benefit from low unit prices.

Avocado

Market situation

Global exports of avocado are estimated to reach approximately 2.3 Mt in 2019, following an expansion of 7% from 2018. Ample global demand and lucrative export unit prices continue to be the main drivers of growth, stimulating substantial investments in area expansion in both major and emerging production zones. However, weather-related production declines in a number of producing countries, most notably in Peru and South Africa, hampered the overall potential of the market, which grew at a significantly lower rate than over the 2014-2018 period. The leading exporter, Mexico, is estimated to have increased its share of global exports to 58% in 2019, on account of area expansion, favourable weather and improved yields.

Projection highlights

Avocado has the lowest production level of this group of tropical fruits but has experienced the fastest growth in output in recent years, underpinned by rapidly expanding import demand. Production is projected to slightly exceed 11 Mt by 2029 – more than two and a half times its level in 2009. Avocado production is concentrated in a small number of regions and countries, with the top ten producing countries accounting for over 80% of global output. In particular, about 70% of avocado production is taking place in Latin America and the Caribbean. In response to rapidly growing global demand, output in Mexico, the world's largest producer and exporter, is expected to grow by 4.9% p.a. over the next ten years. As such, and despite increasing competition from emerging exporters, Mexico is expected to further increase its share of global exports, to 67.6% in 2029. The United States and the European Union, where consumer interest in avocados is fuelled by the fruit's assumed health benefits, are expected to remain the main importers, reaching 50.5% and 28.7% of global imports in 2029, respectively.

Papaya

Market situation

Global exports of papayas are estimated to increase by 8% in 2019, to approximately 0.31 Mt, reflecting a recovery from the weather-related declines experienced in 2017 and 2018. As the largest global exporter of papayas, Mexico is estimated to expand shipments by 7% in 2019 to approximately 0.17 Mt, 99% of which is exported to the United States. Despite the recovery in production and increase in exports over this period, Mexican shipments of papayas continued to be affected by recurring contamination with several strains of the salmonella bacterium, which had first been reported in August 2017.

Projection highlights

Global papaya production is projected to rise by 2.1% p.a., to 16.6 Mt in 2029. The strongest growth is expected to be experienced in Asia, the leading producing region globally. Asia's share of world production is set to rise from 59% in the base period to 61% in 2029. The world's largest producer, India, is projected to increase its papaya production at a rate of 2.4% p.a., thereby expanding its share of global output to

48% by 2029. Income and population growth will be the main factors behind this rise, with Indian per capita consumption of papayas expected to reach 5.5 kg in 2029, up from 4.4 kg in the base period. Global exports will predominantly be shaped by production expansion in Mexico, the largest global exporter of papayas, and higher demand from the key importers, the United States and the European Union. However, a major obstacle to a significant expansion in international trade remains the fruit's high perishability and sensitivity in transport, which makes produce problematic to supply to far afield destinations. Innovations in cold chain, packaging and transport technologies promise to facilitate a broader distribution of papaya, particularly in view of rising consumer demand for tropical fruits in import markets.

Uncertainties

The markets for bananas and major tropical fruits are affected by the COVID-19 pandemic. The trade of perishable products is more at risk of disruption than that of other agricultural products. Due to their high value and the long distance between production and consumption regions, a share of tropical products is transported by air freight, which is particularly disrupted. These impacts may be considerable for producers of those perishable tropical fruits that need to be airfreighted in the short term. The medium-term impact is more uncertain as it depends on the recovery path following the current pandemic. Projections of trade in tropical products and bananas would be sensitive to different economic growth assumptions.

Given the perishable nature of tropical fruits in production, trade and distribution, environmental challenges and insufficient infrastructure continue to challenge production and supply to international markets. This is a particularly acute challenge since the vast majority of tropical fruits are produced in remote, informal settings, where cultivation is highly dependent on rainfall, prone to the adverse effects of increasingly erratic weather events and disconnected from major transport routes.

The presented projections assume average weather conditions, and do not include the potential impacts of climate change, established and emerging plant diseases, or events such as the *El Niño* weather phenomenon, which periodically affect production in the Latin American region. However, the effects of climate-driven changes on global tropical fruit area, changes in actual and attainable yields as well as the impact of increased frequencies of extreme weather events on production and trade could be assessed by making respective changes to the model specifications.

Banana Fusarium Wilt disease, which has been severely affecting banana plantations in several growing regions since the late 19th century, continues to be a serious concern to the global banana industry. The currently expanding strain of the disease, described as Tropical Race 4 (TR4), poses particularly high risks to global banana supplies as it can affect a much broader range of banana and plantain cultivars than other strains of Fusarium wilt, and because no effective fungicide or other eradication method is currently available. According to official information, TR4 is currently confirmed in 17 countries, predominantly in South and Southeast Asia, but also in the Middle East and Latin America, with Colombia reporting the first infection in August 2019. A recently conducted assessment of the potential economic impact of the TR4 disease on global banana production and trade showed that a further spread of TR4 would, *inter alia*, entail considerable loss of income and employment in the banana sector in the affected countries, as well as significantly higher consumer costs in importing countries, at varying degrees contingent on the actual spread of the disease.[3.]

Notes

[1] Pulses types: dry beans, dry broad beans, dry peas, chickpeas, cow peas, pigeon peas, lentils, Bambara beans, vetches, lupines and minor pulses (not elsewhere specified).

2 International commodity classification schemes for production and trade do not require countries to report the fruits within this cluster separately, thus official data remain sparse. It is estimated that, on average, mango accounts for approximately 75% of total production volume, guava for 15% and mangosteen for the remaining 10%.

3 Most recently, an alternative simulation was run to assess the potential economic impact of the Banana Fusarium Wilt Tropical Race 4 disease on global banana production and trade. The results of this scenario were published in the November 2019 issue of FAO's biannual publication *Food Outlook* (http://www.fao.org/3/CA6911EN/CA6911EN.pdf).

Annex A. Glossary

Aquaculture	The farming of aquatic organisms including fish, molluscs, crustaceans, aquatic plants, etc. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding and protection from predators. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms that are harvested by an individual or corporate body that has owned them throughout their rearing period contribute to aquaculture, while aquatic organisms that are exploitable by the public as a common property resource, with or without appropriate licenses, are the harvest of capture fisheries. In this *Outlook*, data relating to aquatic plants are not included.
African Swine Fever (ASF)	ASF is a highly contagious hemorrhagic disease of pigs, warthogs, European wild boar and American wild pigs. It is not a human health threat. The organism that causes ASF is a DNA virus of the Asfarviridae family. (for more information on this topic: http://www.oie.int/doc/ged/d13953.pdf)
Atlantic beef / pigmeat market	The Atlantic market for production and trade of beef and pigmeat consists of countries that are Foot and Mouth Disease (FMD) free with vaccination or contain FMD free zones. Most countries in this market are located around the Atlantic Ocean and typically trade grass-fed beef and grain-fed pigmeat. See also Pacific beef/pigmeat market.
Avian Influenza (AI)	AI is a highly contagious viral infection which can affect all species of birds and can manifest itself in different ways depending mainly on the ability of the virus to cause disease (pathogenicity) on the species affected (for more information on this topic, see http://www.oie.int/doc/ged/D13947.PDF)
Baseline	The set of market projections used for the *Outlook* analysis, also used as benchmark to analyse the impact of different economic and policy scenarios. A detailed description on how this baseline was generated is provided in the methodology section
Biofuels	In the wider sense, biofuels can be defined as all solid, fluid or gaseous fuels produced from biomass. More narrowly, the term comprises fuels that replace petroleum-based road-transport fuels. Ethanol is produced from sugar crops, cereals and other starchy crops, and can be used as an additive to, in a blend with, or as a replacement of gasoline. Biodiesel is produced mostly from vegetable oils, but also from waste oils and animal fats.
Biomass	Biomass is defined as any plant matter used directly as fuel or converted into other forms before combustion. Included are wood, vegetal waste (including wood waste and crops used for energy production), animal materials/wastes and industrial and urban wastes, used as feedstock for producing bio-based products. In the context of the *Outlook*, it does not include agricultural commodities used in the production of biofuels (e.g. vegetable oils, sugar or grains).
Blend wall	The term blend wall refers to short run technical constraints that act as an impediment to increased biofuel use in transportation fuels.
BRICS	Refers to the emerging economies of Brazil, the Russian Federation, India, the People's Republic of China, and South Africa.
Capture fisheries	Capture fisheries refer to the hunting, collecting and gathering activities directed at removing or collecting live wild aquatic organisms (predominantly fish, molluscs and crustaceans) including plants from the oceanic, coastal or inland waters for human consumption and other purposes by hand or more usually by various types of fishing gear such as nets, lines and stationary traps. The production of capture fisheries is

	measured by nominal catches (in live weight basis) of fish, crustaceans, molluscs and other aquatic animals and plants, killed, caught, trapped or collected for all commercial, industrial, recreational and subsistence purposes. It should be noted that in this *Outlook* data relating to aquatic plants are not included.
Cereals	Defined as wheat, maize, other coarse grains and rice.
Common Agricultural Policy (CAP)	The European Union's agricultural policy, first defined in Article 39 of the Treaty of Rome signed in 1957
Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)	CPTPP is a trade agreement between Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Viet Nam. It was signed in March 2018 and came into force for the first six countries in December 2018.
Comprehensive Economic and Trade Agreement (CETA)	CETA is a trade agreement between the European Union and Canada. CETA was signed in October 2016 and is in provisional application as of April 2017. Full ratification and implementation is still pending
COVID-19	COVID-19 is the infectious disease caused by the most recently discovered coronavirus. This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019. COVID-19 is now a pandemic affecting many countries globally.
Decoupled payments	Direct payments which are not linked to current production of specific commodities or livestock numbers or the use of specific factors of production.
Developed and developing countries	See summary table at the end of the Glossary.
Direct payments	Payments made directly by governments to producers
Domestic support	Refers to the annual level of support, expressed in monetary terms, provided to agricultural production. It is one of the three pillars of the Uruguay Round Agreement on Agriculture targeted for reduction.
El Niño- Southern Oscillation	*El Niño*-Southern Oscillation (ENSO) refers to periodic but irregular variations in wind and sea surface temperatures in the tropical eastern Pacific Ocean. ENSO consists of a warming phase known as *El Niño* and a cooling phase known as *La Niña*, and occurs typically at intervals of two to seven years. The abnormal warm ocean climate conditions of *El Niño* are accompanied by higher local rainfall and flooding, and massive deaths of fish and their predators (including birds).
Energy Independence and Security Act (EISA) 2007	US legislation passed in December 2007 that is designed to increase US energy security by lessening dependence on imported oil, to improve energy conservation and efficiency, expand the production of renewable fuels, and to make America's air cleaner for future generations.
Ethanol	A biofuel that can be used as a fuel substitute (hydrous ethanol) or a fuel extender (anhydrous ethanol) in mixes with petroleum, and which is produced from agricultural feed-stocks such as sugar cane and maize. Anhydrous alcohol is free of water and at least 99% pure. Hydrous alcohol contains water and usually has a purity of 96%. In Brazil, this ethanol is being used as a gasohol substitute in flex-fuel vehicles.
Everything-But-Arms (EBA)	The EBA Initiative eliminates EU import tariffs for numerous goods, including agricultural products, from the least developed countries as of 2009-10.
Export subsidies	Subsidies given to traders to cover the difference between internal market prices and world market prices, such as the EU export restitutions. The elimination of agricultural export subsidies is part of the Nairobi Package adopted at the WTO's Tenth Ministerial Conference in December 2015.
Farm Bill	In the United States, the Farm Bill is the primary agricultural and food policy tool of the federal government.
Flexible-fuel vehicles (FFVs)	Vehicles that can run on either gasohol or on hydrous ethanol.
Fresh dairy products	Fresh Dairy Products contain all dairy products and milk which are not included in the processed products (butter, cheese skim milk powder, whole milk powder and for some cases casein and whey). The quantities are in cow milk equivalent.
G20	The G20 is an international forum made up of 19 countries and the European Union, representing the world's major developed and emerging economies. Together, the G20 members represent 85% of global GDP, 75% of international trade, and two-thirds of the world's population.

	Originally bringing together finance ministers and central bank governors, the G20 has evolved into a forum to address broader global challenges.
Gasohol	Fuel that is a mixture of gasoline and anhydrous ethanol.
High Fructose Corn Syrup (HFCS)	Isoglucose sweetener extracted from maize.
Intervention stocks	Stocks held by national intervention agencies in the European Union as a result of intervention buying of commodities subject to market price support. Intervention stocks may be released onto the internal markets if internal prices exceed intervention prices.
Isoglucose	Isoglucose is a starch-based fructose sweetener, produced by the action of the glucose isomerase enzyme on dextrose. This isomerisation process can be used to produce glucose/fructose blends containing up to 42% fructose. Application of a further process can raise the fructose content to 55%. Where the fructose content is 42%, isoglucose is equivalent in sweetness to sugar.
Least squares growth rate	The least-squares growth rate, r, is estimated by fitting a linear regression trend line to the logarithmic annual values of the variable in the relevant period, as follows: Ln(xt) = a + r * t and is calculated as [exp (r) – 1].
Live weight	The weight of meat, finfish and shellfish at the time of their capture or harvest. In the case of fish products it is calculated on the basis of conversion factors from landed to nominal weight and on rates prevailing among national industries for each type of processing.
Market access	Governed by provisions of the Uruguay Round Agreement on Agriculture which refer to concessions contained in the country schedules with respect to bindings and reductions of tariffs and to other minimum import commitments.
Marketing year	It is common to compare crop production across “marketing years,” which are defined so that one season’s harvest is not artificially split up across different calendar years. In this Outlook, international marketing years are mostly defined starting with their harvest in major supply regions, as follows: • Wheat: 1 June • Cotton: 1 August • Maize and other coarse grains: 1 September • Sugar, soybeans, other oilseeds, protein meal, vegetable oils: 1 October. • New Zealand meat: year ended September • Australia meat: year ended June Whenever the text refers to, for example, the marketing year 2019, this is short for 2019/20 for the above commodities. For all other commodities, the marketing year is equal to the calendar year.
North American Free Trade Agreement (NAFTA)	A trilateral agreement on trade, including agricultural trade, between Canada, Mexico, and the United States, phasing out tariffs and revising other trade rules between the three countries over a 15-year period. The agreement was signed in December 1992 and came into effect on 1 January 1994. In 2018, a new agreement between the United States, Mexico and Canada (USMCA) was signed. It is scheduled to come into effect on 1 July 2020 and replace NAFTA.
Other coarse grains	Defined as barley, oats, sorghum and other coarse grains in all countries except Australia where it includes triticale, and in the European Union where it includes rye and other mixed grains.
Other oilseeds	Defined as rapeseed (canola), sunflower seed, and groundnuts (peanuts).
Pacific beef/pigmeat market	The Pacific meat market consists of countries (or zones within countries) that produce and trade livestock free from Foot and Mouth Disease (FMD) without vaccination. FMD status is determined by the OIE according to strict guidelines (www.oie.int/en/animal-health-in-the-world/official-disease-status/fmd/) and includes, *inter alia*, Australia, New Zealand, Japan, Korea, North America and the vast majority of Western Europe. The name “Pacific” refers to the fact that most of them are located around the Pacific Rim. See also Atlantic beef/pigmeat market.
Producer Support Estimate (PSE)	Indicator developed and compiled by the OECD showing the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at farm gate level, and arising from policy measures (regardless of their nature, objectives or impacts on farm

	production or income). The PSE measures support arising from policies targeted to agriculture relative to a situation without such policies, i.e. when producers are subject only to general policies (including economic, social, environmental and tax policies) of the country. The percentage PSE is the ratio of the PSE to the value of total gross farm receipts, measured by the value of total production (at farm gate prices) plus budgetary support (see http://www.oecd.org/agriculture/topics/agricultural-policy-monitoring-and-evaluation/).
Protein meals	Defined as soybean meal, groundnut meal, rapeseed meal, sunflower meal, coconut meal, cottonseed meal and palm kernel meal.
Purchasing Power Parity (PPP)	Purchasing power parities (PPPs) are the rates of currency conversion that eliminate the differences in price levels between countries. The PPPs are given in national currency units per US dollar.
Renewable Energy Directive (RED)	EU directive legislating binding mandates of 20% for the share of renewable energy in all Member States' energy mix by the year 2020, with a specific target of 10% for the renewable energy share in transport fuels.
Renewable Fuel Standard (RFS and RFS2)	A standard in the United States for renewable fuel use in the transport sector in the Energy Act (EISA). RFS2 is a revision of the RFS program for 2010 and beyond.
Roots and Tubers	Plants that yield starch, either derived from their roots (e.g. cassava, sweet potato and yams) or stems (e.g. potatoes and taro). They are destined mainly for human food (as such or in processed form) but can also be used for animal feed or for manufacturing starch, ethanol and fermented beverages. Unless they are processed, they become highly perishable once harvested, which limits opportunities for trade and storage. Roots and tubers contain large amounts of water: all quantities in this publication refer to dry weight to increase comparability.
Scenario	A model-generated set of market projections based on alternative assumptions than those used in the baseline. Used to provide quantitative information on the impact of changes in assumptions on the outlook.
Stock-to-use ratio	The stock-to-use ratio for cereals is defined as the ratio of cereal stocks to its domestic utilisation.
Stock-to-disappearance ratio	The stock-to-disappearance ratio is defined as the ratio of stocks held by the main exporters to their disappearance (i.e. domestic utilisation plus exports). For wheat, the eight major exporters are considered, namely the United States, Argentina, the European Union, Canada, Australia, Russian Federation, Ukraine, and Kazakhstan. In the case of coarse grains, United States, Argentina, the European Union, Canada, Australia, Russian Federation, Ukraine, and Brazil are considered. For rice Viet Nam, Thailand, India, Pakistan and the United States enter this ratio calculation.
Support price	Prices fixed by government policy makers in order to determine, directly or indirectly, domestic market or producer prices. All administered price schemes set a minimum guaranteed support price or a target price for the commodity, which is maintained by associated policy measures, such as quantitative restrictions on production and imports; taxes, levies and tariffs on imports; export subsidies; and/or public stockholding
Tariff-Rate Quota (TRQ)	A two-tier tariff regime where imports within the quota enter at a lower ("in-quota") tariff rate while a higher ("out-of-quota") tariff rate is used for imports above this level, As part of the Uruguay Round Agreement on Agriculture, certain countries agreed to provide minimum import opportunities for products they had previously protected by tariffs.
Tel quel basis	Weight of sugar, regardless of its sucrose content (measured by polarisation).
Uruguay Round Agreement on Agriculture (URAA)	An international agreement negotiated as part of the Uruguay Round of the General Agreement on Tariffs and Trade. The URAA entered into force simultaneously with the establishment of the World Trade Organization in 1995. The URAA contains commitments to improve market access, reduce distorting domestic support, and reduce export subsidies. A separate agreement covers sanitary and phyto sanitary measures known as the SPS Agreement.
Vegetable oils	Defined as rapeseed oil (canola), soybean oil, sunflower seed oil, coconut oil, cottonseed oil, palm kernel oil, groundnut oil and palm oil.

World Trade Organization (WTO)	Intergovernmental organisation regulating international trade, providing a framework for negotiating trade agreements, and acting as dispute resolution process. The WTO was created by the Uruguay Round agreement and officially commenced in 1995.

Annex B. Methodology

This section provides information on how the projections in the *Agricultural Outlook* are generated. First, a general description of the agricultural baseline projections and the *Outlook* report is given. Second, the compilation of a consistent set of the assumptions on macroeconomic projections is discussed in more detail. Section 3 provides reference to the underlying Aglink-Cosimo model, while the last section explains how a partial stochastic analysis is performed with the Aglink-Cosimo model.

The process of generating the *OECD-FAO Agricultural Outlook*

The projections presented in are the result of a process that brings together information from a large number of sources. The projections rely on input from country and commodity experts, and from the OECD-FAO Aglink-Cosimo model of global agricultural markets. This economic model is also used to ensure the consistency of baseline projections. A large amount of expert judgement, however, is applied at various stages of the *Outlook* process. The *Agricultural Outlook* presents a unified assessment judged by the OECD and FAO Secretariats to be plausible given the underlying assumptions and the information available at the time of writing.

The starting point: Creation of an initial baseline

The data series for the historic values are drawn from OECD and FAO databases. For the most part, information in these databases has been taken from national statistical sources. Starting values for the likely future development of agricultural markets are developed separately by OECD for its member states and some non-member countries and by FAO for all remaining countries.

- On the OECD side, an annual questionnaire is circulated in November to national administrations. Through these questionnaires, the OECD Secretariat obtains information on how countries expect their agricultural sector to develop for the various commodities covered in the *Outlook*, as well as on the evolution of agricultural policies.
- On the FAO side, the starting projections for the country modules are developed through model-based projections and consultations with FAO commodity specialists.

External sources, such as the International Monetary Fund (IMF), the World Bank and the United Nations (UN), are also used to complete the view of the main economic forces determining market developments.

This part of the process is aimed at creating a first insight into possible market developments and at establishing the key assumptions which condition the *Outlook*. The main economic and policy assumptions are summarised in the overview chapter and in specific commodity tables. The sources for the assumptions are discussed in more detail further below.

As a next step, the OECD-FAO Aglink-Cosimo modelling framework is used to facilitate a consistent integration of the initial data and to derive an initial baseline of global market projections. The modelling framework ensures that at a global level, projected levels of consumption match with projected levels of production for the different commodities. The model is discussed in section three below.

In addition to quantities produced, consumed and traded, the baseline also includes projections for nominal prices (in local currency units) for the commodities concerned.[1]

The initial baseline results are then reviewed:

- For the countries under the OECD Secretariat's responsibility, the initial baseline results are compared with the questionnaire replies. Any issues are discussed in bilateral exchanges with country experts.
- For country and regional modules developed by the FAO Secretariat, initial baseline results are reviewed by a wider circle of in-house and international experts.

Final baseline

At this stage, the global projection picture starts to emerge, and refinements are made according to a consensus view of both Secretariats and external advisors. On the basis of these discussions and updated information, a second baseline is produced. The information generated is used to prepare market assessments for cereals, oilseeds, sugar, meats, dairy products, fish, biofuels and cotton over the course of the *Outlook* period.

These results are then discussed at the annual meetings of the Group on Commodity Markets of the OECD Committee for Agriculture, which brings together experts from national administrations of OECD countries as well as experts from commodity organisations. Following comments by this group, and data revisions, the baseline projections are finalised.

The *Outlook* process implies that the baseline projections presented in this report are a combination of projections and expert knowledge. The use of a formal modelling framework reconciles inconsistencies between individual country projections and forms a global equilibrium for all commodity markets. The review process ensures that judgement of country experts is brought to bear on the projections and related analyses. However, the final responsibility for the projections and their interpretation rests with the OECD and FAO Secretariats.

The revised projections form the basis for the writing of the *Agricultural Outlook*, which is discussed by the Senior Management Committee of FAO's Department of Economic and Social Development and the OECD's Working Party on Agricultural Policies and Markets of the Committee for Agriculture in May, prior to publication. In addition, the *Outlook* will be used as a basis for analyses presented to the FAO's Committee on Commodity Problems and its various Intergovernmental Commodity Groups.

Sources and assumptions for the macroeconomic projections

Population estimates from the 2019 Revision of the United Nations Population Prospects database provide the population data used for all countries and regional aggregates in the *Outlook*. For the projection period, the medium variant set of estimates was selected for use from the four alternative projection variants (low, medium, high and constant fertility). The UN Population Prospects database was chosen because it represents a comprehensive source of reliable estimates which includes data for non-OECD developing countries. For consistency reasons, the same source is used for both the historical population estimates and the projection data.

The other macroeconomic series used in the Aglink-Cosimo model are real GDP, the GDP deflator, the private consumption expenditure (PCE) deflator, the Brent crude oil price (in US dollars per barrel) and exchange rates expressed as the local currency value of USD 1. Historical data for these series in OECD countries as well as Brazil, Argentina, the People's Republic of China and the Russian Federation are consistent with those published in the *OECD Economic Outlook* No. 106 (November 2019). For other economies, historical macroeconomic data were obtained from the IMF, *World Economic Outlook* (October 2019). Assumptions for 2020 to 2029 are based on the recent medium term macroeconomic projections of the OECD Economics Department, projections of the *OECD Economic Outlook* No. 106, and projections of the IMF.

The model uses indices for real GDP, consumer prices (PCE deflator) and producer prices (GDP deflator) which are constructed with the base year 2010 value being equal to 1. The assumption of constant real exchange rates implies that a country with higher (lower) inflation relative to the United States (as measured by the US GDP deflator) will have a depreciating (appreciating) currency and therefore an increasing (decreasing) exchange rate over the projection period, since the exchange rate is measured as the local currency value of USD 1. The calculation of the nominal exchange rate uses the percentage growth of the ratio "country-GDP deflator/US GDP deflator".

The oil price used to generate the *Outlook* until 2018 is taken from the short-term update of the *OECD Economic Outlook* No. 106 (November 2019). For 2019, the annual average monthly spot price is used, while the average daily spot price for December 2019 is used as the oil price value for the year 2020. Brent crude oil prices from 2021 are assumed to remain flat in real terms.

The underlying Aglink-Cosimo model

Aglink-Cosimo is an economic model that analyses supply and demand of world agriculture. It is managed by the Secretariats of the OECD and the Food and Agriculture Organization of the United Nations (FAO), and used to generate the *OECD-FAO Agricultural Outlook* and policy scenario analysis.

Aglink-Cosimo is a recursive-dynamic, partial equilibrium model used to simulate developments of annual market balances and prices for the main agricultural commodities produced, consumed and traded worldwide. The Aglink-Cosimo country and regional modules covering the whole world, and projections are developed and maintained by the OECD and FAO Secretariats in conjunction with country experts and national administrations. Several key characteristics are as follows:

- Aglink-Cosimo is a "partial equilibrium" model for the main agricultural commodities, as well as biodiesel and bioethanol. Other non-agricultural markets are not modelled and are treated exogenously to the model. As non-agricultural markets are exogenous, hypotheses concerning the paths of key macroeconomic variables are predetermined with no accounting of feedback from developments in agricultural markets to the economy as a whole.
- World markets for agricultural commodities are assumed to be competitive, with buyers and sellers acting as price takers. Market prices are determined through a global or regional equilibrium in supply and demand.
- Domestically produced and traded commodities are viewed to be homogeneous and thus perfect substitutes by buyers and sellers. In particular, importers do not distinguish commodities by country of origin as Aglink-Cosimo is not a spatial model. Imports and exports are nevertheless determined separately. This assumption will affect the results of analysis in which trade is a major driver.
- Aglink-Cosimo is recursive-dynamic, and outcomes for one year influence those for the next years (e.g. through herd sizes). Aglink-Cosimo models ten years into the future.

A detailed documentation of Aglink-Cosimo was produced in 2015 and is available on www.agri-outlook.org.

The model used to generate the fish projections is operated as a satellite model to Aglink Cosimo. Exogenous assumptions are shared and interacting variables (e.g. prices for cross-price reactions) are exchanged. The fish model went through substantial revision in 2016. The aggregated aquaculture supply functions of 32 components of the model were replaced by 117 species-specific supply functions with specific elasticity, feed ration and time lag. The main species covered are salmon and trout, shrimp, tilapia, carp, catfish (including Pangasius), seabream and seabass, and molluscs. A few other minor productions such as milkfish were also included. The model was constructed to ensure consistency between the feed rations and the fishmeal and fish oil markets. Depending on the species, the feed rations can contain a maximum of five types of feed; fishmeal, fish oil, oilseed meals (or substitutes), vegetable oil and low protein feeds like cereals and brans.

The methodology of stochastic simulations with Aglink-Cosimo

The partial stochastic analysis highlights how alternative scenarios diverge from the baseline by treating a number of variables stochastically. The selection of variables treated stochastically aims at identifying the major sources of uncertainty for agricultural markets. In particular, country specific macroeconomic variables, the crude oil price, and country- and product-specific yields are treated as uncertain within this partial stochastic framework. Apart from the international oil price, four macroeconomic variables are considered in all countries: the consumer price index (CPI), the gross domestic product index (GDPI), the gross domestic product deflator (GDPD) and the US-Dollar exchange rate (XR). The yield variables considered contain crop and milk yields in all model regions.

In 2019, the previous methodology to determine the stochastic draws (explained in Araujo-Enciso, Pieralli and Pérez-Domínguez, 2017[2]) was abandoned. The approach applied is based on a simpler process which is easier to understand and still captures the historical variance of each single variable. The three main steps of the partial stochastic process are briefly explained below.

(i) The quantification of the past variability around the trend for each macroeconomic and yield variable separately

The first step is to define the historical trend of stochastic variables. Often a linear trend does not represent adequately observed dynamics. Consequently, a non-linear trend is estimated by applying a Hodrick-Prescott filter, which seeks to separate short-term fluctuations from long-term movements.[3] The filter is applied to the yield time series directly and to year-on-year changes for macro variables.

(ii) The generation of 1 000 sets of possible values for the stochastic variables

The second step involves generating 1 000 sets of possible values for the stochastic variables. For each year of the 2020-2029 projection period, one year of the historical period 1995-2019 is drawn. The relative deviation between the actual variable value of that year and the respective trend value estimated in step 1 is then applied to the value of the variable in the actual projection year. All variables thereby receive the value of the same historical year. The process, however, handles macro variables separated from yields, as both are not strongly correlated.

(iii) The execution of the Aglink-Cosimo model for each of these 1 000 possible alternative sets of values (uncertainty scenarios)

The third step involves running the AGLINK-COSIMO model for each of the 1 000 alternative “uncertainty” scenarios generated in step 2. When both macroeconomic and yield uncertainty were included, this procedure yielded 990 successful simulations. The model did not solve the remaining ten cases. This can occur as the model is a complex system of equations and policies that may lead to infeasibilities when exposed to extreme shocks in one or several stochastic variables.

Notes

[1] Trade data for regions, e.g. the European Union or regional aggregates of developing countries, refer only to extra-regional trade. This approach results in a smaller overall trade figure than cumulated national statistics. For further details on particular series, enquiries should be directed to the OECD and FAO Secretariats.

[2] Araujo Enciso, S., S. Pieralli, and I. Perez Dominguez (2017), *Partial Stochastic Analysis with the Aglink-Cosimo Model: A Methodological Overview*, EUR 28863 EN, Publications Office of the European Union, Luxembourg, 2017, doi: 10.2760/680976, JRC108837.

[3] The filter was popularised in the field of economics in the 1990s in Robert Hodrick and Edward C. Prescott (1997), "Postwar U.S. Business Cycles: An Empirical Investigation", *Journal of Money, Credit, and Banking*, Vol. 29 (1), pp. 1–16. JSTOR 2953682.

Annex C. Statistical annex

Table C.1. World cereal projections

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
WHEAT												
World												
Production	Mt	752.5	764.9	774.2	782.5	791.6	799.9	807.5	815.4	823.0	830.8	838.5
Area	Mha	216.4	217.0	217.6	217.5	217.6	217.7	217.7	217.7	217.7	217.6	217.6
Yield	t/ha	3.48	3.52	3.56	3.60	3.64	3.67	3.71	3.75	3.78	3.82	3.85
Consumption	Mt	747.4	761.0	770.7	780.0	787.6	795.3	802.9	810.8	818.4	826.1	833.8
Feed use	Mt	149.4	152.9	154.0	155.9	157.6	159.5	161.4	163.3	165.0	167.0	168.9
Food use	Mt	511.5	521.2	527.2	532.4	537.1	541.2	545.7	550.1	554.5	558.6	562.6
Biofuel use	Mt	9.2	9.0	8.9	8.9	8.9	9.0	9.1	9.3	9.5	9.7	9.8
Other use	Mt	77.4	77.9	80.6	82.8	83.9	85.7	86.6	88.0	89.4	90.9	92.5
Exports	Mt	173.1	184.2	188.9	192.4	196.1	199.1	201.8	204.5	207.1	209.8	212.5
Closing stocks	Mt	270.1	274.4	277.9	280.3	284.4	288.9	293.6	298.2	302.7	307.4	312.0
Price[1]	USD/t	225.4	217.0	218.8	222.4	227.9	232.1	236.4	240.7	244.8	249.1	253.4
Developed countries												
Production	Mt	388.6	402.1	406.1	410.2	414.9	419.2	423.2	427.1	430.7	434.4	438.1
Consumption	Mt	273.8	272.3	271.5	272.4	273.7	275.1	276.4	278.0	279.4	280.8	282.3
Net trade	Mt	118.4	129.5	134.1	137.5	140.9	143.5	145.8	148.2	150.5	152.7	155.0
Closing stocks	Mt	74.8	70.7	71.1	71.4	71.6	72.2	73.1	74.1	74.9	75.8	76.6
Developing countries												
Production	Mt	364.0	362.8	368.1	372.3	376.7	380.7	384.4	388.3	392.3	396.3	400.4
Consumption	Mt	473.7	488.7	499.1	507.6	513.9	520.2	526.5	532.8	539.0	545.3	551.5
Net trade	Mt	-118.2	-129.5	-134.1	-137.5	-140.9	-143.5	-145.8	-148.2	-150.5	-152.7	-155.0
Closing stocks	Mt	195.3	203.7	206.8	209.0	212.8	216.7	220.4	224.1	227.8	231.6	235.4
OECD[2]												
Production	Mt	275.9	285.6	287.1	288.5	290.3	292.3	294.4	296.6	298.6	300.6	302.7
Consumption	Mt	225.5	224.3	224.2	224.8	225.7	226.5	227.4	228.6	229.7	230.7	231.8
Net trade	Mt	52.1	60.8	61.9	63.0	64.2	65.2	66.2	67.2	68.2	69.2	70.2
Closing stocks	Mt	63.4	60.8	61.7	62.4	62.7	63.2	64.1	64.8	65.5	66.2	66.8
MAIZE												
World												
Production	Mt	1 122.1	1 160.1	1 173.1	1 187.3	1 205.3	1 223.4	1 242.6	1 260.4	1 278.6	1 296.6	1 315.2
Area	Mha	188.9	191.0	191.5	192.2	193.0	193.8	194.6	195.3	196.1	196.9	197.6
Yield	t/ha	5.94	6.07	6.13	6.18	6.24	6.31	6.39	6.45	6.52	6.59	6.65
Consumption	Mt	1 141.5	1 172.6	1 193.2	1 204.6	1 222.8	1 237.4	1 252.6	1 266.5	1 282.5	1 297.7	1 313.2
Feed use	Mt	675.1	684.1	694.7	706.6	720.5	733.0	746.0	756.1	768.2	779.6	791.3
Food use	Mt	141.8	145.9	147.8	149.9	151.9	154.0	156.1	158.1	160.2	162.3	164.4
Biofuel use	Mt	181.4	186.0	187.2	187.7	188.0	188.3	188.9	189.0	189.4	189.7	190.0
Other use	Mt	97.6	111.2	117.6	114.3	115.8	115.1	114.1	115.2	116.1	117.1	118.1
Exports	Mt	158.5	163.2	167.1	170.5	174.4	177.8	181.1	184.3	187.5	190.9	194.3
Closing stocks	Mt	358.4	315.5	295.4	278.1	260.7	246.7	236.7	230.6	226.7	225.6	227.6
Price[3]	USD/t	165.2	168.1	171.3	174.5	178.2	181.1	184.3	187.7	190.8	194.1	197.6
Developed countries												
Production	Mt	511.4	524.1	528.3	533.0	537.9	542.9	547.6	552.2	556.9	561.6	566.4
Consumption	Mt	464.0	469.4	473.1	476.0	479.9	483.2	486.5	489.6	492.6	495.7	498.8
Net trade	Mt	49.5	53.3	53.7	55.3	57.3	59.0	60.6	62.2	63.9	65.5	67.3
Closing stocks	Mt	90.2	86.1	87.6	89.4	89.9	90.5	91.0	91.5	91.9	92.3	92.6
Developing countries												
Production	Mt	610.7	636.0	644.9	654.2	667.5	680.6	695.1	708.2	721.6	735.0	748.8
Consumption	Mt	677.6	703.2	720.1	728.6	742.8	754.2	766.2	776.9	789.9	802.0	814.4
Net trade	Mt	-51.2	-53.3	-53.7	-55.3	-57.3	-59.0	-60.6	-62.2	-63.9	-65.5	-67.3
Closing stocks	Mt	268.1	229.3	207.8	188.8	170.7	156.2	145.7	139.2	134.8	133.3	134.9
OECD[2]												
Production	Mt	477.8	486.9	490.8	494.5	498.2	502.2	505.8	509.3	512.9	516.4	520.1
Consumption	Mt	496.8	504.0	508.2	511.6	516.1	519.8	523.5	527.1	530.6	534.2	537.8
Net trade	Mt	-17.3	-18.2	-19.2	-19.1	-18.5	-18.3	-18.3	-18.2	-18.2	-18.2	-18.0
Closing stocks	Mt	90.9	85.0	86.9	88.9	89.5	90.1	90.7	91.1	91.5	91.9	92.3

Table C.1. World cereal projections *(cont.)*

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
OTHER COARSE GRAINS												
World												
Production	Mt	289.8	296.5	299.2	301.6	303.4	306.2	308.8	311.4	313.9	316.4	318.9
Area	Mha	153.7	154.3	154.2	154.0	153.8	153.7	153.6	153.5	153.4	153.3	153.2
Yield	t/ha	1.89	1.92	1.94	1.96	1.97	1.99	2.01	2.03	2.05	2.06	2.08
Consumption	Mt	282.6	290.3	293.4	295.2	298.3	299.9	302.2	304.9	307.0	309.7	312.4
Feed use	Mt	144.9	146.1	148.2	150.4	151.8	153.0	154.1	155.2	156.4	157.6	158.9
Food use	Mt	78.9	80.0	81.1	82.3	83.2	84.0	84.9	85.9	86.9	87.9	89.0
Biofuel use	Mt	9.1	9.0	9.0	9.0	9.0	9.0	9.1	9.1	9.1	9.1	9.2
Other use	Mt	49.6	55.1	54.9	53.5	54.3	53.9	54.2	54.7	54.6	55.1	55.4
Exports	Mt	42.0	43.9	44.3	44.6	45.0	45.5	46.0	46.6	47.2	47.8	48.4
Closing stocks	Mt	50.4	55.6	55.5	56.1	55.3	55.8	56.5	57.2	58.2	59.0	59.6
Price[4]	USD/t	196.9	188.6	193.2	197.3	204.6	209.7	214.2	218.0	221.7	225.7	229.6
Developed countries												
Production	Mt	173.3	178.8	179.6	180.5	180.9	181.9	182.8	183.7	184.4	185.2	186.0
Consumption	Mt	142.5	146.6	147.3	146.8	148.0	147.6	147.7	148.1	148.0	148.3	148.6
Net trade	Mt	30.3	32.0	32.5	32.9	33.5	34.1	34.7	35.4	36.0	36.6	37.3
Closing stocks	Mt	24.9	28.8	28.6	29.4	28.8	29.0	29.4	29.5	29.9	30.2	30.3
Developing countries												
Production	Mt	116.5	117.7	119.6	121.1	122.5	124.3	126.0	127.7	129.4	131.2	132.9
Consumption	Mt	140.1	143.7	146.1	148.4	150.3	152.3	154.5	156.7	159.0	161.4	163.8
Net trade	Mt	-24.4	-26.2	-26.7	-27.0	-27.6	-28.3	-28.8	-29.6	-30.2	-30.8	-31.4
Closing stocks	Mt	25.4	26.7	27.0	26.7	26.5	26.7	27.1	27.7	28.3	28.8	29.3
OECD[2]												
Production	Mt	140.1	145.5	145.8	146.4	146.5	147.2	147.8	148.3	148.7	149.1	149.6
Consumption	Mt	121.9	127.4	127.8	127.2	128.4	128.1	128.3	128.8	128.7	129.1	129.4
Net trade	Mt	17.9	18.3	18.4	18.3	18.7	19.0	19.2	19.5	19.7	19.9	20.1
Closing stocks	Mt	17.7	20.6	20.2	21.0	20.5	20.7	21.0	21.0	21.3	21.5	21.5
RICE												
World												
Production	Mt	515.0	532.5	535.7	540.1	545.1	550.7	557.0	563.0	569.3	575.5	581.8
Area	Mha	164.9	166.2	165.9	165.7	165.6	165.6	165.6	165.6	165.6	165.6	165.6
Yield	t/ha	3.12	3.20	3.23	3.26	3.29	3.33	3.36	3.40	3.44	3.47	3.51
Consumption	Mt	511.7	529.5	535.7	541.2	545.9	551.5	557.1	562.7	568.6	574.6	580.8
Feed use	Mt	17.8	17.5	17.7	18.0	18.2	18.5	18.7	18.9	19.1	19.4	19.6
Food use	Mt	414.2	428.5	432.6	436.0	439.1	443.5	447.8	452.0	456.4	460.7	465.1
Exports	Mt	47.2	49.0	50.5	51.5	52.7	54.2	55.8	57.2	58.8	60.4	62.1
Closing stocks	Mt	178.2	181.9	181.6	180.4	179.4	178.3	178.0	178.1	178.6	179.3	180.1
Price[5]	USD/t	428.7	435.3	431.8	434.1	441.3	449.4	455.7	462.2	467.5	472.3	476.2
Developed countries												
Production	Mt	17.6	18.7	18.2	18.3	18.4	18.4	18.4	18.4	18.5	18.5	18.7
Consumption	Mt	20.4	20.6	20.5	20.4	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Net trade	Mt	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Closing stocks	Mt	4.2	3.7	3.4	3.4	3.4	3.4	3.5	3.5	3.6	3.8	4.1
Developing countries												
Production	Mt	497.4	513.8	517.4	521.8	526.7	532.3	538.5	544.6	550.8	557.0	563.0
Consumption	Mt	491.3	508.9	515.1	520.7	525.4	531.0	536.6	542.2	548.1	554.1	560.2
Net trade	Mt	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3
Closing stocks	Mt	173.9	178.2	178.2	177.0	176.0	174.9	174.5	174.6	175.0	175.5	176.0
OECD[2]												
Production	Mt	22.4	23.5	23.0	23.1	23.1	23.1	23.2	23.1	23.1	23.1	23.3
Consumption	Mt	25.7	25.8	25.7	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.7
Net trade	Mt	-2.4	-2.4	-2.4	-2.5	-2.5	-2.5	-2.6	-2.6	-2.6	-2.6	-2.7
Closing stocks	Mt	5.7	5.2	5.0	5.0	5.0	5.0	5.1	5.1	5.2	5.4	5.7

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. No.2 hard red winter wheat, ordinary protein, United States FOB Gulf Ports (June/May).
2. Excludes Iceland but includes all EU member countries.
3. No.2 yellow corn, United States FOB Gulf Ports (September/August).
4. Feed barley, Europe, FOB Rouen (July/June).
5. Milled 100%, grade b, nominal price quote, FOB Bangkok (January/December).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.2. World oilseed projections

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SOYBEAN												
World												
Production	Mt	347.3	364.1	367.1	372.2	377.2	382.0	386.7	391.9	396.7	401.5	406.2
Area	Mha	124.2	126.2	126.2	126.9	127.5	128.1	128.6	129.2	129.8	130.3	130.7
Yield	t/ha	2.80	2.88	2.91	2.93	2.96	2.98	3.01	3.03	3.06	3.08	3.11
Consumption	Mt	348.3	358.6	367.5	372.3	377.3	382.1	386.7	391.6	396.5	401.3	406.1
Crush	Mt	313.0	323.4	332.1	336.8	341.5	346.1	350.4	355.1	359.7	364.3	368.8
Closing stocks	Mt	43.3	45.5	45.1	44.9	44.9	44.7	44.7	45.0	45.3	45.5	45.7
Price[1]	USD/t	384.4	394.6	404.4	412.7	420.6	429.0	439.7	447.7	455.9	465.0	474.3
Developed countries												
Production	Mt	132.5	134.3	134.1	135.5	136.8	138.1	139.4	140.8	142.2	143.5	144.9
Consumption	Mt	94.7	96.6	97.1	97.6	98.2	98.6	99.0	99.4	99.8	100.1	100.5
Crush	Mt	85.9	87.6	88.1	88.5	89.0	89.5	89.7	90.1	90.4	90.8	91.1
Closing stocks	Mt	21.4	22.0	21.5	21.1	20.8	20.4	20.3	20.4	20.5	20.5	20.5
Developing countries												
Production	Mt	214.8	229.8	233.0	236.7	240.4	243.9	247.3	251.1	254.6	258.0	261.3
Consumption	Mt	253.6	262.0	270.4	274.8	279.1	283.5	287.7	292.2	296.7	301.2	305.6
Crush	Mt	227.1	235.9	244.1	248.3	252.4	256.6	260.6	265.0	269.2	273.5	277.7
Closing stocks	Mt	21.9	23.5	23.6	23.8	24.1	24.3	24.4	24.6	24.9	25.1	25.2
OECD[2]												
Production	Mt	123.3	124.8	124.4	125.7	126.8	127.9	129.0	130.2	131.4	132.5	133.7
Consumption	Mt	96.1	97.8	98.4	98.9	99.6	100.1	100.5	100.9	101.4	101.8	102.2
Crush	Mt	87.7	89.2	89.8	90.3	90.9	91.4	91.7	92.1	92.5	92.9	93.3
Closing stocks	Mt	21.0	21.8	21.2	20.9	20.5	20.2	20.1	20.1	20.2	20.2	20.1
OTHER OILSEEDS												
World												
Production	Mt	153.9	156.5	158.4	160.8	163.0	164.9	166.9	168.9	170.9	172.9	174.9
Area	Mha	88.8	88.8	89.0	89.5	89.8	90.0	90.2	90.4	90.6	90.8	91.0
Yield	t/ha	1.73	1.76	1.78	1.80	1.82	1.83	1.85	1.87	1.89	1.90	1.92
Consumption	Mt	153.8	156.6	158.7	160.8	162.9	164.8	166.8	168.8	170.9	172.9	174.9
Crush	Mt	133.0	135.3	137.1	139.1	141.0	142.8	144.6	146.3	148.2	149.9	151.7
Closing stocks	Mt	10.3	9.4	9.1	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.5
Price[3]	USD/t	426.6	431.2	448.4	457.0	461.6	471.0	479.6	487.6	494.6	502.0	509.8
Developed countries												
Production	Mt	93.3	93.9	94.9	96.3	97.4	98.4	99.3	100.3	101.4	102.3	103.3
Consumption	Mt	84.7	85.5	86.3	87.3	88.1	88.8	89.5	90.2	90.9	91.6	92.3
Crush	Mt	77.7	78.4	79.1	80.1	80.9	81.6	82.3	82.9	83.5	84.2	84.8
Closing stocks	Mt	8.3	7.9	7.6	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.8
Developing countries												
Production	Mt	60.6	62.6	63.5	64.6	65.6	66.5	67.5	68.6	69.6	70.6	71.6
Consumption	Mt	69.1	71.1	72.3	73.5	74.7	76.0	77.3	78.6	79.9	81.3	82.6
Crush	Mt	55.3	56.9	58.0	59.0	60.0	61.2	62.3	63.5	64.6	65.8	66.9
Closing stocks	Mt	2.0	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7
OECD[2]												
Production	Mt	59.7	58.1	58.5	59.2	59.7	60.1	60.4	60.8	61.2	61.5	61.9
Consumption	Mt	57.8	56.5	56.8	57.2	57.5	57.7	57.9	58.1	58.2	58.4	58.6
Crush	Mt	52.3	51.1	51.4	51.7	52.1	52.3	52.5	52.6	52.7	52.9	53.0
Closing stocks	Mt	7.2	6.4	6.1	6.1	6.2	6.2	6.2	6.1	6.2	6.2	6.2
PROTEIN MEALS												
World												
Production	Mt	342.7	354.0	362.2	367.5	372.8	377.8	382.6	387.7	392.8	397.9	402.9
Consumption	Mt	343.1	354.1	362.2	367.4	372.7	377.7	382.5	387.6	392.7	397.8	402.9
Closing stocks	Mt	14.9	13.4	13.4	13.4	13.5	13.6	13.7	13.7	13.8	13.9	14.0
Price[4]	USD/t	323.6	315.3	319.3	326.5	334.3	341.2	349.3	357.4	364.7	373.1	381.7
Developed countries												
Production	Mt	110.7	112.5	113.4	114.4	115.5	116.2	116.8	117.4	118.1	118.7	119.4
Consumption	Mt	124.0	125.3	126.3	126.9	127.8	128.2	128.6	129.0	129.5	130.0	130.5
Closing stocks	Mt	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
Developing countries												
Production	Mt	231.9	241.5	248.8	253.1	257.3	261.6	265.8	270.3	274.7	279.2	283.6
Consumption	Mt	219.1	228.8	235.9	240.5	244.9	249.4	253.9	258.6	263.2	267.8	272.4
Closing stocks	Mt	13.0	11.6	11.6	11.6	11.7	11.8	11.8	11.9	12.0	12.0	12.1
OECD[2]												
Production	Mt	102.4	103.2	104.0	104.8	105.7	106.3	106.8	107.3	107.8	108.3	108.8
Consumption	Mt	130.9	132.1	133.3	134.1	135.1	135.7	136.3	136.9	137.6	138.2	138.8
Closing stocks	Mt	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4

Table C.2. World oilseed projections *(cont.)*

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
VEGETABLE OILS												
World												
Production	Mt	209.5	217.1	220.8	224.1	227.5	230.6	233.8	237.0	240.2	243.4	246.7
of which palm oil	Mt	76.8	81.1	82.1	83.4	84.7	85.9	87.1	88.4	89.7	90.9	92.2
Consumption	Mt	209.8	217.7	220.6	223.6	227.2	230.3	233.5	236.7	239.9	243.2	246.4
Food	Mt	138.8	142.3	144.9	147.3	150.3	152.8	155.5	158.2	161.1	164.1	167.1
Biofuel	Mt	29.2	32.2	31.8	31.7	31.7	31.6	31.4	31.3	30.9	30.5	30.1
Exports	Mt	84.8	87.4	88.5	89.5	90.8	92.0	93.2	94.3	95.5	96.7	97.9
Closing stocks	Mt	21.6	19.4	19.7	20.2	20.6	20.9	21.1	21.3	21.6	21.9	22.2
Price[5]	USD/t	724.0	775.7	800.0	818.9	828.8	845.5	864.6	879.6	893.4	907.2	921.8
Developed countries												
Production	Mt	51.6	51.8	52.3	52.8	53.4	53.8	54.1	54.5	54.9	55.2	55.6
Consumption	Mt	56.7	55.9	56.0	56.0	56.2	56.2	56.3	56.2	56.1	56.0	55.9
Closing stocks	Mt	3.9	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Developing countries												
Production	Mt	157.9	165.3	168.5	171.3	174.2	176.8	179.6	182.5	185.3	188.2	191.1
Consumption	Mt	153.1	161.7	164.6	167.6	170.9	174.1	177.2	180.5	183.8	187.2	190.5
Closing stocks	Mt	17.7	15.8	16.1	16.6	17.0	17.2	17.4	17.7	18.0	18.3	18.5
OECD[2]												
Production	Mt	43.1	42.8	43.2	43.6	44.0	44.2	44.5	44.7	44.9	45.2	45.4
Consumption	Mt	57.9	57.2	57.3	57.3	57.6	57.6	57.7	57.7	57.6	57.5	57.5
Closing stocks	Mt	3.6	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4

Note: Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Soybean, U.S., CIF Rotterdam (October/September).
2. Excludes Iceland but includes all EU member countries.
3. Rapeseed, Europe, CIF Hamburg (October/September).
4. Weighted average protein meal, European port (October/September).
5. Weighted average price of oilseed oils and palm oil, European port (October/September).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.3. World sugar projections

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
WORLD												
SUGARBEET												
Production	Mt	296.7	290.9	295.6	298.3	301.1	303.7	306.4	309.0	311.3	313.3	315.1
Area	Mha	5.0	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Yield	t/ha	59.46	59.12	59.60	60.01	60.41	60.85	61.29	61.72	62.13	62.53	62.95
Biofuel use	Mt	12.8	13.5	13.5	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
SUGARCANE												
Production	Mt	1 713.0	1 736.8	1 778.2	1 803.6	1 822.0	1 839.0	1 855.1	1 870.6	1 888.5	1 907.1	1 929.7
Area	Mha	24.4	24.5	24.9	25.0	25.1	25.1	25.1	25.2	25.3	25.3	25.5
Yield	t/ha	70.12	70.83	71.51	72.13	72.72	73.28	73.80	74.29	74.79	75.26	75.72
Biofuel use	Mt	400.1	427.4	432.7	438.0	443.0	450.0	454.6	461.1	466.7	472.9	478.6
SUGAR												
Production	Mt tq	175.6	176.2	182.0	185.1	187.2	189.6	192.2	194.6	197.1	199.9	202.8
Consumption	Mt tq	171.1	175.0	177.5	180.2	182.8	185.3	187.9	190.6	193.3	195.9	198.6
Closing stocks	Mt tq	83.3	76.8	78.4	80.2	81.7	83.0	84.4	85.4	86.3	87.3	88.6
Price, raw sugar[1]	USD/t	286.5	318.9	314.4	323.0	330.7	337.1	344.1	353.9	364.7	375.0	385.7
Price, white sugar[2]	USD/t	357.0	399.0	394.4	403.7	409.0	416.6	423.1	432.1	444.2	456.2	468.9
Price, HFCS[3]	USD/t	821.7	616.6	519.8	535.2	541.9	550.0	557.3	571.5	588.6	603.9	620.3
DEVELOPED COUNTRIES												
SUGARBEET												
Production	Mt	239.9	231.7	235.1	236.5	238.0	239.2	240.6	241.8	242.6	243.1	243.4
SUGARCANE												
Production	Mt	81.1	80.2	80.6	81.0	81.5	81.8	82.2	82.4	82.7	83.1	83.6
SUGAR												
Production	Mt tq	43.7	41.7	42.2	42.5	42.9	43.2	43.6	43.9	44.2	44.5	44.7
Consumption	Mt tq	46.2	45.7	45.8	45.8	45.8	45.8	45.8	45.8	45.7	45.7	45.6
Closing stocks	Mt tq	14.4	13.3	13.3	13.6	13.8	13.9	13.9	13.9	13.8	13.8	13.8
HFCS												
Production	Mt dw	8.9	8.9	9.0	9.0	9.0	9.1	9.1	9.2	9.2	9.3	9.3
Consumption	Mt dw	7.8	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8
DEVELOPING COUNTRIES												
SUGARBEET												
Production	Mt	56.8	59.3	60.5	61.8	63.1	64.5	65.8	67.3	68.7	70.2	71.7
SUGARCANE												
Production	Mt	1 631.9	1 656.6	1 697.5	1 722.6	1 740.6	1 757.2	1 772.9	1 788.1	1 805.8	1 824.0	1 846.1
SUGAR												
Production	Mt tq	131.9	134.5	139.8	142.6	144.3	146.4	148.6	150.7	152.9	155.5	158.1
Consumption	Mt tq	124.9	129.3	131.7	134.3	136.9	139.5	142.1	144.8	147.5	150.2	152.9
Closing stocks	Mt tq	68.9	63.5	65.0	66.7	67.9	69.2	70.5	71.5	72.5	73.6	74.8
HFCS												
Production	Mt dw	4.5	4.9	5.0	5.1	5.2	5.3	5.4	5.6	5.7	5.8	5.9
Consumption	Mt dw	5.6	5.9	6.1	6.2	6.4	6.6	6.7	6.9	7.1	7.3	7.5
OECD[4]												
SUGARBEET												
Production	Mt	187.0	181.9	184.3	185.1	186.0	186.8	187.7	188.5	188.9	188.9	188.7
SUGARCANE												
Production	Mt	153.3	152.6	153.6	154.6	155.4	156.1	156.6	156.9	157.2	157.7	158.2
SUGAR												
Production	Mt tq	42.7	41.1	41.5	41.8	42.1	42.4	42.7	42.9	43.1	43.3	43.4
Consumption	Mt tq	44.9	44.5	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6
Closing stocks	Mt tq	14.0	13.1	13.3	13.6	13.8	13.9	14.0	14.0	14.0	14.0	14.1
HFCS												
Production	Mt dw	9.9	9.8	9.9	9.9	9.9	10.0	10.0	10.1	10.1	10.2	10.3
Consumption	Mt dw	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9	9.9	10.0	10.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.HFCS: High fructose corn syrup. Prices are in nominal terms.

1. Raw sugar world price, ICE contract No11 nearby (October/September).
2. Refined sugar price, White Sugar Futures Contract No. 407, Euronext market, Liffe, London, Europe (October/September).
3. United States wholesale list price HFCS-55, dry weight (October/September).
4. Excludes Iceland but includes all EU member countries.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.4. World meat projections

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
WORLD												
BEEF AND VEAL												
Production	kt cwe	69 774	71 140	71 698	71 910	72 429	72 929	73 525	74 185	74 788	75 448	76 005
Consumption	kt cwe	69 479	70 882	71 451	71 637	72 149	72 660	73 243	73 906	74 507	75 170	75 728
PIGMEAT												
Production	kt cwe	116 595	106 526	109 006	112 829	116 274	119 869	123 466	125 300	126 114	126 797	127 526
Consumption	kt cwe	116 269	106 279	108 775	112 585	116 028	119 622	123 219	125 053	125 864	126 549	127 278
POULTRY MEAT												
Production	kt rtc	125 312	132 067	133 301	134 561	136 116	137 666	139 256	140 831	142 436	144 076	145 711
Consumption	kt rtc	124 419	131 230	132 426	133 696	135 255	136 809	138 402	139 983	141 591	143 235	144 874
SHEEP MEAT												
Production	kt cwe	15 047	15 429	15 649	15 874	16 096	16 317	16 542	16 702	16 861	17 027	17 194
Consumption	kt cwe	15 079	15 520	15 742	15 965	16 194	16 415	16 636	16 790	16 946	17 109	17 269
TOTAL MEAT												
Per capita consumption[1]	kg rwt	34.5	33.7	33.8	34.0	34.3	34.6	34.8	34.9	34.9	34.9	34.9
DEVELOPED COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	30 642	30 796	30 820	30 582	30 688	30 773	30 953	31 200	31 417	31 680	31 828
Consumption	kt cwe	29 261	29 513	29 571	29 344	29 421	29 509	29 638	29 810	29 960	30 170	30 272
PIGMEAT												
Production	kt cwe	45 625	46 747	46 252	45 983	45 960	46 044	46 133	46 206	46 306	46 377	46 491
Consumption	kt cwe	41 185	41 239	41 363	41 417	41 491	41 647	41 777	41 891	41 969	42 042	42 133
POULTRY MEAT												
Production	kt rtc	51 103	53 172	53 554	53 940	54 320	54 663	55 043	55 418	55 802	56 213	56 620
Consumption	kt rtc	48 427	50 313	50 609	51 005	51 356	51 686	52 046	52 338	52 649	52 977	53 290
SHEEP MEAT												
Production	kt cwe	3 506	3 513	3 548	3 583	3 612	3 636	3 663	3 688	3 713	3 742	3 774
Consumption	kt cwe	2 734	2 716	2 734	2 750	2 771	2 788	2 802	2 816	2 829	2 846	2 863
TOTAL MEAT												
Per capita consumption[1]	kg rwt	68.6	69.5	69.6	69.6	69.7	69.9	70.1	70.3	70.5	70.7	70.9
DEVELOPING COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	39 132	40 344	40 879	41 328	41 741	42 156	42 572	42 985	43 371	43 768	44 176
Consumption	kt cwe	40 218	41 369	41 881	42 292	42 727	43 150	43 605	44 096	44 547	45 000	45 456
PIGMEAT												
Production	kt cwe	70 971	59 778	62 754	66 846	70 314	73 825	77 332	79 095	79 807	80 420	81 036
Consumption	kt cwe	75 084	65 040	67 413	71 168	74 537	77 975	81 441	83 162	83 895	84 507	85 146
POULTRY MEAT												
Production	kt rtc	74 209	78 895	79 747	80 621	81 796	83 002	84 212	85 413	86 634	87 864	89 092
Consumption	kt rtc	75 992	80 917	81 817	82 691	83 899	85 123	86 356	87 645	88 942	90 258	91 584
SHEEP MEAT												
Production	kt cwe	11 541	11 916	12 101	12 291	12 484	12 680	12 879	13 014	13 149	13 284	13 421
Consumption	kt cwe	12 346	12 804	13 009	13 216	13 423	13 627	13 834	13 974	14 117	14 262	14 406
TOTAL MEAT												
Per capita consumption[1]	kg rwt	26.6	25.6	25.8	26.2	26.5	26.8	27.2	27.3	27.4	27.4	27.4
OECD[2]												
BEEF AND VEAL												
Production	kt cwe	29 556	29 820	29 850	29 596	29 698	29 795	29 978	30 230	30 439	30 697	30 837
Consumption	kt cwe	28 460	28 731	28 801	28 575	28 655	28 757	28 888	29 071	29 220	29 431	29 531
PIGMEAT												
Production	kt cwe	43 735	44 904	44 423	44 209	44 215	44 324	44 435	44 529	44 648	44 740	44 873
Consumption	kt cwe	40 561	40 853	40 994	41 083	41 186	41 374	41 536	41 682	41 790	41 896	42 017
POULTRY MEAT												
Production	kt rtc	51 191	53 321	53 667	54 054	54 448	54 827	55 245	55 661	56 088	56 540	56 989
Consumption	kt rtc	48 189	50 234	50 597	51 038	51 436	51 813	52 224	52 571	52 930	53 311	53 681
SHEEP MEAT												
Production	kt cwe	2 759	2 742	2 763	2 784	2 798	2 808	2 820	2 830	2 839	2 854	2 871
Consumption	kt cwe	2 042	2 010	2 017	2 022	2 032	2 037	2 040	2 043	2 045	2 051	2 056
TOTAL MEAT												
Per capita consumption[1]	kg rwt	69.3	70.3	70.3	70.3	70.5	70.6	70.9	71.0	71.2	71.4	71.6

Note: Calendar Year; except year ending 30 September for New Zealand in aggregates. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.
2. Excludes Iceland but includes all EU member countries.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.5. World dairy projections: Milk, butter and cheese

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
MILK												
World												
Production	kt pw	839 528	867 394	880 960	895 238	909 366	923 731	937 871	952 498	967 183	982 282	996 760
Inventory	000 hd	707 939	725 750	731 507	737 337	743 256	749 909	756 337	762 840	769 352	775 756	782 044
Yield	t/head	1.19	1.20	1.20	1.21	1.22	1.23	1.24	1.25	1.26	1.27	1.27
Developed countries												
Production	kt pw	401 312	406 072	408 634	411 441	414 121	416 699	418 934	421 512	424 050	426 922	429 208
Inventory	000 hd	78 741	78 710	78 612	78 507	78 381	78 279	78 182	78 086	77 993	77 903	77 810
Yield	t/head	5.10	5.16	5.20	5.24	5.28	5.32	5.36	5.40	5.44	5.48	5.52
Developing countries												
Production	kt pw	438 216	461 322	472 326	483 797	495 246	507 032	518 936	530 986	543 133	555 360	567 552
Inventory	000 hd	629 198	647 041	652 896	658 831	664 876	671 630	678 155	684 755	691 359	697 854	704 234
Yield	t/head	0.70	0.71	0.72	0.73	0.74	0.75	0.77	0.78	0.79	0.80	0.81
OECD[1]												
Production	kt pw	366 080	369 940	372 324	374 977	377 613	380 155	382 328	384 837	387 317	390 134	392 376
Inventory	000 hd	81 755	83 146	83 208	83 349	83 596	83 892	84 147	84 376	84 619	84 870	85 118
Yield	t/head	4.48	4.45	4.47	4.50	4.52	4.53	4.54	4.56	4.58	4.60	4.61
FRESH DAIRY PRODUCTS												
World												
Consumption	kt pw	421 910	440 120	448 278	456 984	465 808	474 855	483 936	493 474	502 527	511 584	520 625
Developed countries												
Consumption	kt pw	132 662	133 454	133 860	134 337	134 865	135 401	135 938	136 483	137 026	137 523	138 058
Developing countries												
Consumption	kt pw	289 248	306 666	314 418	322 647	330 943	339 454	347 998	356 992	365 501	374 060	382 568
OECD[1]												
Consumption	kt pw	104 822	104 308	104 590	104 941	105 368	105 816	106 265	106 726	107 202	107 647	108 152
BUTTER												
World												
Production	kt pw	11 310	11 722	11 968	12 173	12 363	12 560	12 763	12 964	13 170	13 377	13 584
Consumption	kt pw	11 254	11 763	11 966	12 170	12 360	12 556	12 759	12 961	13 166	13 374	13 581
Stock changes	kt pw	-4	-42	3	3	4	3	3	3	3	3	3
Price[2]	USD/t	4 927	4 028	4 112	4 199	4 270	4 348	4 425	4 502	4 573	4 646	4 722
Developed countries												
Production	kt pw	4 736	4 754	4 827	4 866	4 899	4 929	4 960	4 988	5 015	5 044	5 070
Consumption	kt pw	4 173	4 259	4 266	4 282	4 294	4 304	4 315	4 324	4 333	4 344	4 354
Developing countries												
Production	kt pw	6 574	6 968	7 141	7 307	7 464	7 630	7 803	7 976	8 154	8 333	8 513
Consumption	kt pw	7 081	7 504	7 700	7 888	8 066	8 252	8 444	8 637	8 833	9 030	9 227
OECD[1]												
Production	kt pw	4 624	4 693	4 777	4 827	4 870	4 911	4 952	4 990	5 026	5 063	5 098
Consumption	kt pw	4 099	4 236	4 259	4 291	4 316	4 339	4 363	4 385	4 408	4 431	4 454
Stock changes	kt pw	0	-42	3	3	4	3	3	3	3	3	3
CHEESE												
World												
Production	kt pw	23 579	24 139	24 428	24 705	24 984	25 287	25 584	25 889	26 196	26 517	26 829
Consumption	kt pw	23 566	24 138	24 427	24 705	24 984	25 286	25 583	25 889	26 195	26 517	26 828
Stock changes	kt pw	-65	1	1	0	1	0	1	1	1	1	1
Price[3]	USD/t	3 805	3 784	3 868	3 955	4 042	4 132	4 220	4 311	4 398	4 489	4 582
Developed countries												
Production	kt pw	19 459	19 924	20 132	20 323	20 520	20 743	20 960	21 184	21 406	21 643	21 868
Consumption	kt pw	18 529	18 935	19 107	19 263	19 423	19 607	19 784	19 968	20 153	20 351	20 538
Developing countries												
Production	kt pw	4 121	4 215	4 296	4 382	4 465	4 543	4 623	4 705	4 790	4 875	4 961
Consumption	kt pw	5 036	5 203	5 320	5 442	5 561	5 680	5 800	5 920	6 042	6 166	6 290
OECD[1]												
Production	kt pw	19 001	19 410	19 611	19 795	19 977	20 185	20 386	20 593	20 798	21 016	21 222
Consumption	kt pw	18 282	18 619	18 792	18 946	19 100	19 277	19 447	19 625	19 802	19 993	20 174
Stock changes	kt pw	-65	1	1	0	1	0	1	1	1	1	1

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand in aggregates. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Excludes Iceland but includes all EU member countries.
2. FOB export price, butter, 82% butterfat, Oceania.
3. FOB export price, cheddar cheese, 39% moisture, Oceania.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.6. World dairy projections: Powders and casein

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
SKIM MILK POWDER												
World												
Production	kt pw	4 359	4 473	4 570	4 653	4 728	4 805	4 879	4 953	5 027	5 105	5 184
Consumption	kt pw	4 511	4 504	4 569	4 652	4 727	4 805	4 879	4 953	5 028	5 106	5 184
Stock changes	kt pw	-164	-30	1	1	1	0	0	0	0	0	0
Price[1]	USD/t	2 220	2 913	2 997	3 062	3 136	3 207	3 272	3 339	3 404	3 472	3 538
Developed countries												
Production	kt pw	3 799	3 890	3 970	4 044	4 109	4 176	4 241	4 306	4 372	4 441	4 511
Consumption	kt pw	1 920	1 842	1 840	1 851	1 860	1 867	1 871	1 874	1 877	1 883	1 888
Developing countries												
Production	kt pw	560	583	600	609	620	629	638	647	655	664	673
Consumption	kt pw	2 591	2 662	2 729	2 800	2 868	2 937	3 008	3 079	3 150	3 223	3 296
OECD[2]												
Production	kt pw	3 564	3 637	3 711	3 782	3 843	3 908	3 970	4 032	4 096	4 162	4 229
Consumption	kt pw	1 965	1 925	1 925	1 939	1 952	1 964	1 973	1 980	1 988	1 998	2 008
Stock changes	kt pw	-159	-30	1	1	1	0	0	0	0	0	0
WHOLE MILK POWDER												
World												
Production	kt pw	5 033	5 066	5 162	5 255	5 344	5 436	5 527	5 618	5 710	5 802	5 894
Consumption	kt pw	5 089	5 075	5 174	5 255	5 344	5 436	5 527	5 618	5 710	5 802	5 894
Stock changes	kt pw	18	-9	-12	0	0	0	0	0	0	0	0
Price[3]	USD/t	3 078	3 243	3 302	3 385	3 459	3 534	3 606	3 679	3 750	3 824	3 898
Developed countries												
Production	kt pw	2 444	2 514	2 542	2 561	2 587	2 615	2 644	2 673	2 704	2 733	2 763
Consumption	kt pw	663	722	730	723	725	728	731	734	737	740	743
Developing countries												
Production	kt pw	2 589	2 552	2 620	2 694	2 757	2 821	2 883	2 944	3 006	3 069	3 131
Consumption	kt pw	4 427	4 353	4 444	4 532	4 619	4 708	4 796	4 884	4 973	5 062	5 151
OECD[2]												
Production	kt pw	2 630	2 705	2 738	2 763	2 791	2 822	2 854	2 886	2 919	2 951	2 984
Consumption	kt pw	893	945	957	956	962	970	977	984	991	998	1 006
Stock changes	kt pw	18	-9	-12	0	0	0	0	0	0	0	0
WHEY POWDER												
Price[4]	USD/t	958	965	976	999	1 026	1 045	1 068	1 089	1 110	1 132	1 158
CASEIN												
Price[5]	USD/t	6 062	6 462	6 579	6 713	6 847	6 982	7 116	7 251	7 387	7 524	7 662

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand in aggregates. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. FOB export price, non-fat dry milk, 1.25% butterfat, Oceania.
2. Excludes Iceland but includes all EU member countries.
3. FOB export price, WMP 26% butterfat, Oceania.
4. FOB export price, sweet whey non-hygroscopic, Western Europe.
5. Export price, New Zealand.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.7. World fish and seafood projections

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
FISH[1]												
World												
Production	kt	175 798	179 002	178 372	182 285	185 418	188 113	190 563	191 516	195 448	197 962	200 400
of which aquaculture	kt	81 910	85 964	87 691	89 955	92 343	94 655	96 860	99 037	101 007	103 078	105 205
Consumption	kt	176 248	180 497	179 717	183 480	186 463	189 008	191 308	192 111	195 893	198 257	200 545
of which for food	kt	155 109	160 016	160 492	163 355	166 389	168 930	171 289	173 106	175 756	178 119	180 416
of which for reduction	kt	16 902	16 404	15 220	16 201	16 222	16 297	16 310	15 367	16 571	16 643	16 686
Price												
Aquaculture[2]	USD/t	3 022.3	3 041.0	3 194.8	3 328.8	3 420.7	3 567.4	3 634.4	3 684.9	3 629.6	3 660.5	3 708.5
Capture[3]	USD/t	1 831.0	1 917.0	1 978.3	2 036.3	2 078.4	2 149.9	2 188.4	2 238.8	2 214.9	2 231.2	2 247.2
Product traded[4]	USD/t	3 032.7	3 135.0	3 260.0	3 396.7	3 490.6	3 603.4	3 634.4	3 684.9	3 629.6	3 660.5	3 690.1
Developed countries												
Production	kt	30 101	30 262	30 245	30 423	30 741	30 889	30 978	31 121	31 249	31 349	31 410
of which aquaculture	kt	4 694	4 870	4 954	5 049	5 164	5 280	5 324	5 421	5 505	5 569	5 597
Consumption	kt	37 859	37 858	37 713	38 042	38 279	38 416	38 438	38 557	38 665	38 853	39 024
of which for food	kt	31 724	32 064	31 924	32 267	32 497	32 645	32 665	32 770	32 888	33 085	33 264
of which for reduction	kt	4 928	4 651	4 648	4 636	4 646	4 636	4 640	4 656	4 648	4 641	4 635
Developing countries												
Production	kt	145 697	148 740	148 128	151 861	154 677	157 224	159 585	160 395	164 199	166 612	168 990
of which aquaculture	kt	77 216	81 094	82 737	84 907	87 179	89 375	91 536	93 616	95 502	97 509	99 608
Consumption	kt	138 389	142 638	142 004	145 437	148 184	150 592	152 870	153 554	157 228	159 403	161 521
of which for food	kt	123 385	127 952	128 568	131 088	133 893	136 285	138 624	140 337	142 868	145 034	147 152
of which for reduction	kt	11 974	11 753	10 572	11 565	11 576	11 661	11 670	10 711	11 923	12 002	12 051
OECD												
Production	kt	29 473	29 684	29 302	29 568	29 905	30 075	30 171	29 925	30 335	30 587	30 714
of which aquaculture	kt	6 756	7 051	7 163	7 280	7 422	7 563	7 627	7 755	7 882	7 988	8 073
Consumption	kt	39 434	39 253	38 890	39 329	39 584	39 740	39 772	39 668	39 945	40 180	40 372
of which for food	kt	32 811	32 962	32 814	33 203	33 460	33 612	33 637	33 716	33 861	34 083	34 273
of which for reduction	kt	5 198	4 957	4 754	4 817	4 828	4 844	4 863	4 693	4 838	4 863	4 878
FISHMEAL[5]												
World												
Production	kt	5 343.4	5 305.3	5 057.7	5 364.5	5 429.5	5 506.0	5 566.7	5 375.8	5 749.6	5 824.0	5 890.2
from whole fish	kt	4 085.0	4 012.5	3 738.4	4 009.3	4 034.5	4 074.5	4 096.6	3 871.1	4 203.3	4 239.8	4 269.0
Consumption	kt	5 353.1	5 312.9	5 290.8	5 236.6	5 336.1	5 490.2	5 549.7	5 619.6	5 650.6	5 739.2	5 874.7
Variation in stocks	kt	-12.8	-7.6	-233.2	127.9	93.4	15.8	17.0	-243.9	99.0	84.9	15.5
Price[6]	USD/t	1 447.7	1 418.3	1 502.5	1 467.1	1 499.1	1 539.3	1 575.7	1 701.3	1 638.8	1 656.4	1 676.9
Developed countries												
Production	kt	1 591.5	1 531.6	1 544.2	1 556.2	1 578.0	1 592.0	1 610.3	1 631.3	1 646.5	1 662.2	1 678.1
from whole fish	kt	1 175.9	1 120.6	1 125.5	1 127.0	1 133.0	1 134.3	1 138.8	1 146.4	1 148.0	1 150.1	1 152.2
Consumption	kt	1 640.2	1 621.7	1 566.5	1 544.5	1 552.2	1 573.5	1 564.3	1 553.3	1 555.9	1 558.5	1 566.4
Variation in stocks	kt	-9.1	-32.6	-52.2	35.9	6.4	1.8	4.0	-52.9	34.5	8.4	3.0
Developing countries												
Production	kt	3 751.9	3 773.6	3 513.4	3 808.3	3 851.4	3 914.0	3 956.3	3 744.4	4 103.1	4 161.8	4 212.1
from whole fish	kt	2 909.1	2 892.0	2 612.9	2 882.3	2 901.5	2 940.2	2 957.8	2 724.7	3 055.3	3 089.7	3 116.8
Consumption	kt	3 867.5	3 801.2	3 824.4	3 782.1	3 863.9	3 986.7	4 045.4	4 116.3	4 134.8	4 210.6	4 328.3
Variation in stocks	kt	-3.7	25.0	-181.0	92.0	87.0	14.0	13.0	-191.0	64.5	76.5	12.5
OECD												
Production	kt	1 614.5	1 557.4	1 524.5	1 555.6	1 579.6	1 601.7	1 624.8	1 603.1	1 655.5	1 680.0	1 702.0
from whole fish	kt	1 200.8	1 145.4	1 104.9	1 125.9	1 134.2	1 143.8	1 153.3	1 118.4	1 157.4	1 168.4	1 176.8
Consumption	kt	1 873.8	1 921.6	1 864.9	1 831.0	1 842.0	1 871.9	1 863.8	1 855.5	1 863.5	1 876.2	1 899.0
Variation in stocks	kt	5.2	-47.6	-62.2	30.9	11.4	3.8	7.0	-57.9	34.5	10.4	6.0

Table C.7. World fish and seafood projections *(cont.)*

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
FISH OIL[5]												
World												
Production	kt	1 187.4	1 270.8	1 224.6	1 286.5	1 300.2	1 316.4	1 328.8	1 294.4	1 363.6	1 377.9	1 391.2
from whole fish	kt	702.2	729.1	674.6	724.8	727.8	734.0	736.4	692.1	752.6	758.2	762.5
Consumption	kt	1 210.2	1 254.9	1 254.4	1 261.6	1 299.2	1 312.9	1 327.4	1 336.3	1 339.2	1 382.2	1 392.5
Variation in stocks	kt	-22.8	13.0	-31.8	23.9	1.0	4.5	3.4	-38.9	28.5	-0.2	0.7
Price[7]	USD/t	1 600.3	1 871.0	1 956.0	1 898.3	1 920.0	1 959.4	2 003.8	2 131.7	2 075.9	2 106.4	2 142.9
Developed countries												
Production	kt	457.1	460.8	465.1	469.4	474.8	479.4	484.3	489.6	493.9	498.0	502.0
from whole fish	kt	214.9	201.4	200.7	199.7	199.8	199.2	199.0	199.3	198.7	198.3	197.9
Consumption	kt	593.9	611.8	616.6	618.4	639.7	650.5	658.6	671.1	667.1	691.5	695.0
Variation in stocks	kt	-4.1	-9.1	-13.8	11.9	3.0	-0.5	-0.6	-14.9	11.5	2.8	-0.3
Developing countries												
Production	kt	732.3	810.0	759.6	817.1	825.5	837.0	844.5	804.8	869.7	879.9	889.2
from whole fish	kt	489.3	527.7	473.9	525.1	528.1	534.8	537.5	492.8	553.8	559.9	564.6
Consumption	kt	578.1	623.0	619.9	627.2	645.5	650.4	658.8	657.2	666.1	686.7	695.5
Variation in stocks	kt	-18.8	22.0	-18.0	12.0	-2.0	5.0	4.0	-24.0	17.0	-3.0	1.0
OECD												
Production	kt	558.4	559.1	554.3	563.2	569.5	575.9	582.4	579.3	591.9	598.2	603.7
from whole fish	kt	252.5	244.1	233.9	237.0	237.5	238.2	239.1	230.5	237.8	239.0	239.7
Consumption	kt	771.2	803.6	802.7	813.4	841.1	851.9	860.5	862.4	869.4	902.6	910.4
Variation in stocks	kt	4.7	-11.1	-19.8	14.9	-1.0	6.5	0.4	-21.9	14.5	-2.2	-0.3

Note: The term “fish” indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Data are in live weight equivalent.
2. World unit value of aquaculture fisheries production (live weight basis).
3. FAO estimated value of world ex vessel value of capture fisheries production excluding for reduction.
4. World unit value of trade (sum of exports and imports).
5. Data are in product weight.
6. Fishmeal, 64-65% protein, Hamburg, Germany.
7. Fish oil, any origin, N.W. Europe.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.8. World biofuel projections

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ETHANOL												
World												
Production	bln L	124.9	130.8	132.1	133.0	133.9	134.9	135.8	136.8	137.9	139.0	140.1
Consumption	bln L	124.7	130.6	131.9	132.9	133.8	134.9	135.9	136.9	138.1	139.2	140.2
Exports	bln L	10.7	10.6	10.5	10.4	10.2	10.1	10.0	9.9	9.8	9.8	9.7
Price[1]	USD/hl	38.7	39.6	42.7	45.9	47.4	48.2	49.4	49.4	50.0	50.7	51.3
Developed countries												
Production	bln L	70.8	71.9	72.4	72.5	72.7	72.8	73.2	73.4	73.7	73.9	74.1
Consumption	bln L	69.2	70.6	71.3	71.6	71.9	72.1	72.5	72.8	73.1	73.3	73.5
Net trade	bln L	1.6	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Developing countries												
Production	bln L	54.1	58.9	59.7	60.5	61.1	62.0	62.6	63.5	64.2	65.1	66.0
Consumption	bln L	55.6	60.0	60.6	61.3	61.9	62.8	63.4	64.2	65.0	65.9	66.7
Net trade	bln L	-2.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.7	-0.7	-0.7	-0.7	-0.7
OECD[2]												
Production	bln L	70.3	71.6	72.1	72.2	72.4	72.5	72.8	73.0	73.3	73.5	73.7
Consumption	bln L	70.0	71.6	72.3	72.6	72.9	73.1	73.5	73.8	74.1	74.3	74.5
Net trade	bln L	0.3	-0.3	-0.4	-0.5	-0.6	-0.6	-0.6	-0.7	-0.7	-0.6	-0.6
BIODIESEL												
World												
Production	bln L	43.1	48.3	47.4	47.2	47.2	47.1	46.9	46.7	46.4	46.0	45.6
Consumption	bln L	43.6	49.4	48.5	48.3	48.2	48.2	48.0	47.8	47.5	47.1	46.7
Exports	bln L	6.1	6.0	5.8	5.7	5.5	5.3	5.1	4.9	4.7	4.6	4.4
Price[3]	USD/hl	83.2	81.8	85.8	88.8	90.5	91.2	91.5	92.6	93.8	94.7	95.1
Developed countries												
Production	bln L	24.3	27.1	26.0	25.7	25.4	25.1	24.7	24.3	23.8	23.3	22.7
Consumption	bln L	27.4	30.3	29.2	28.9	28.5	28.2	27.7	27.3	26.8	26.1	25.5
Net trade	bln L	-3.4	-3.1	-3.2	-3.1	-3.1	-3.0	-3.0	-2.9	-2.9	-2.8	-2.7
Developing countries												
Production	bln L	18.8	21.2	21.4	21.6	21.7	22.0	22.2	22.4	22.6	22.8	22.9
Consumption	bln L	16.2	19.1	19.3	19.4	19.7	20.0	20.2	20.5	20.7	20.9	21.2
Net trade	bln L	2.6	2.1	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.7
OECD[2]												
Production	bln L	25.6	28.5	27.4	27.0	26.8	26.5	26.1	25.7	25.2	24.6	24.1
Consumption	bln L	28.7	31.7	30.6	30.2	29.9	29.6	29.1	28.7	28.1	27.5	26.8
Net trade	bln L	-3.3	-3.1	-3.1	-3.1	-3.1	-3.0	-3.0	-2.9	-2.9	-2.8	-2.7

Note: Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Wholesale price, United States, Omaha.
2. Excludes Iceland but includes all EU member countries.
3. Producer price Germany net of biodiesel tariff and energy tax.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.9. World cotton projections

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
WORLD												
Production	Mt	26.2	26.1	26.5	26.9	27.3	27.6	28.0	28.4	28.9	29.4	29.8
Area	Mha	33.3	33.7	33.8	34.0	34.2	34.3	34.5	34.6	34.8	35.0	35.2
Yield	t/ha	0.79	0.78	0.78	0.79	0.80	0.81	0.81	0.82	0.83	0.84	0.85
Consumption[1]	Mt	26.2	26.6	27.0	27.5	27.8	28.1	28.5	28.8	29.2	29.7	30.1
Exports	Mt	9.2	9.3	9.6	9.9	10.2	10.3	10.5	10.7	10.9	11.1	11.3
Closing stocks	Mt	18.6	17.8	17.2	16.4	15.7	15.1	14.5	13.9	13.4	13.0	12.5
Price[2]	USD/t	1 834.4	1 656.6	1 659.8	1 680.7	1 690.0	1 715.2	1 739.2	1 778.9	1 809.7	1 836.0	1 858.1
DEVELOPED COUNTRIES												
Production	Mt	6.5	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0
Consumption	Mt	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0
Exports	Mt	5.0	4.6	4.8	4.9	5.0	5.0	5.1	5.2	5.2	5.3	5.4
Imports	Mt	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Closing stocks	Mt	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
DEVELOPING COUNTRIES												
Production	Mt	19.7	20.1	20.4	20.6	20.9	21.1	21.4	21.8	22.1	22.5	22.9
Consumption	Mt	24.5	24.8	25.2	25.7	26.0	26.3	26.6	26.9	27.3	27.7	28.2
Exports	Mt	4.2	4.7	4.9	5.1	5.2	5.3	5.4	5.5	5.7	5.8	6.0
Imports	Mt	8.7	8.8	9.0	9.4	9.6	9.8	10.0	10.1	10.3	10.6	10.8
Closing stocks	Mt	16.5	15.7	15.0	14.3	13.6	13.0	12.4	11.8	11.3	10.8	10.4
OECD[3]												
Production	Mt	6.5	6.1	6.2	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1
Consumption	Mt	3.1	3.1	3.2	3.2	3.3	3.3	3.3	3.4	3.4	3.4	3.5
Exports	Mt	4.7	4.4	4.5	4.6	4.8	4.9	5.0	5.0	5.1	5.2	5.3
Imports	Mt	1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7
Closing stocks	Mt	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated. Prices are in nominal terms.

1. Consumption for cotton means mill consumption and not final consumer demand.
2. Cotlook A index, Middling 1 1/8", c.f.r. far Eastern ports (August/July).
3. Excludes Iceland but includes all EU member countries.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.10. Economic assumptions

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
REAL GDP[1]												
Australia	%	2.3	2.3	2.3	2.7	3.3	3.3	3.2	3.2	3.1	3.1	3.1
Canada	%	2.1	1.6	1.7	1.7	2.1	2.1	2.1	2.1	2.1	2.1	2.0
Chile	%	2.6	3.0	3.2	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2
European Union	%	1.8	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Japan	%	1.2	0.6	0.7	0.5	1.1	1.2	1.2	1.3	1.3	1.3	1.3
Korea	%	2.6	2.3	2.3	2.9	2.8	2.7	2.6	2.5	2.5	2.4	2.3
Mexico	%	1.4	1.2	1.6	2.1	2.8	2.8	2.9	2.9	3.0	3.1	3.2
New Zealand	%	2.7	2.5	2.4	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5
Norway	%	1.6	2.4	2.3	1.6	2.2	2.1	2.0	2.0	1.9	1.9	1.9
Switzerland	%	1.8	1.4	1.0	1.6	2.1	2.1	2.1	2.0	2.0	2.0	2.0
Turkey	%	3.5	3.0	3.0	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5
United Kingdom	%	1.5	1.0	1.2	1.5	2.8	2.7	2.7	2.6	2.6	2.5	2.5
United States	%	2.5	2.0	2.0	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.3
Brazil	%	1.0	1.7	1.8	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.7
China	%	6.5	5.7	5.5	5.7	4.4	4.2	4.0	3.9	3.7	3.6	3.5
Egypt	%	5.0	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
India	%	6.7	7.0	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3
Indonesia	%	5.1	5.1	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Iran	%	-3.5	0.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1
Malaysia	%	5.0	4.4	4.9	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9
Pakistan	%	4.7	2.4	3.0	4.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Russia	%	1.7	1.6	1.4	2.0	2.8	2.8	2.8	2.8	2.7	2.7	2.6
Saudi Arabia	%	0.6	2.2	2.2	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5
South Africa	%	1.0	1.1	1.4	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Ukraine	%	2.9	3.0	3.1	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3
OECD[2,3]	%	2.2	1.7	1.7	2.0	2.2	2.2	2.2	2.1	2.1	2.1	2.1
PCE DEFLATOR[1]												
Australia	%	1.6	1.7	1.6	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	1.6	1.9	1.8	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Chile	%	2.2	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
European Union	%	1.5	1.2	1.3	1.6	1.7	1.8	1.7	1.7	1.7	1.7	1.7
Japan	%	0.3	1.0	1.0	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Korea	%	1.2	1.3	1.4	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Mexico	%	4.2	2.8	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	1.5	1.7	1.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Norway	%	2.1	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Switzerland	%	0.7	0.6	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Turkey	%	14.4	12.6	12.4	11.4	11.0	11.0	11.0	11.0	11.0	11.0	11.0
United Kingdom	%	1.8	1.8	1.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	1.8	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	3.1	3.0	3.4	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5
China	%	2.0	2.4	2.8	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Egypt	%	19.4	10.0	7.2	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
India	%	3.5	4.1	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Indonesia	%	3.4	3.3	3.1	3.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Iran	%	2.1	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	1.9	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Pakistan	%	5.1	13.0	8.3	6.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Russia	%	3.7	3.5	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saudi Arabia	%	0.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
South Africa	%	4.8	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Ukraine	%	11.4	5.9	5.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
OECD[2,3]	%	2.5	2.6	2.7	2.8	2.9	3.0	3.0	3.1	3.2	3.3	3.4

Table C.10. Economic assumptions *(cont.)*

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
GDP DEFLATOR[1]												
Australia	%	3.0	1.3	1.1	2.3	2.4	2.1	2.1	2.1	2.1	2.1	2.1
Canada	%	2.1	2.0	1.9	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1
Chile	%	3.0	2.6	3.3	3.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0
European Union	%	1.1	1.4	1.5	1.4	1.5	1.6	1.5	1.5	1.5	1.5	1.5
Japan	%	0.1	0.9	1.0	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Korea	%	0.7	1.1	1.3	1.6	1.8	2.0	2.0	2.0	2.0	2.0	2.0
Mexico	%	5.1	2.7	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	2.2	2.2	2.0	2.2	2.0	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	3.0	1.5	2.2	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Switzerland	%	0.1	0.7	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Turkey	%	13.9	11.8	11.6	10.9	10.8	11.0	11.0	11.0	11.0	11.0	11.0
United Kingdom	%	2.0	1.7	1.6	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	2.0	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	3.5	3.1	3.5	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
China	%	2.7	1.5	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3
Egypt	%	19.4	9.7	7.1	7.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
India	%	3.8	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Indonesia	%	3.8	3.3	3.0	3.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Iran	%	2.1	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	1.8	1.3	2.2	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3
Pakistan	%	5.0	12.8	9.9	7.0	5.2	5.1	5.1	5.1	5.1	5.1	5.1
Russia	%	6.8	2.9	2.9	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saudi Arabia	%	6.0	-1.6	-0.1	1.2	1.6	2.0	2.0	2.0	2.0	2.0	2.0
South Africa	%	4.5	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Ukraine	%	15.8	8.3	6.8	6.2	5.9	5.6	5.6	5.6	5.6	5.6	5.6
OECD[3]	%	2.5	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3
WORLD INPUT PRICES												
Brent crude oil[4]	USD/barrel	63.1	64.8	66.2	67.5	68.9	70.3	71.7	73.2	74.7	76.2	77.8
Fertiliser[5]	USD/t	258.0	261.5	265.4	268.8	272.2	275.0	279.0	283.5	288.1	292.7	297.3
EXCHANGE RATES												
Australia	AUD/USD	1.36	1.47	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46
Canada	CAD/USD	1.31	1.31	1.31	1.29	1.27	1.25	1.23	1.21	1.19	1.17	1.16
Chile	CLP/USD	656.72	685.57	689.60	694.40	699.41	704.61	709.85	715.13	720.44	725.80	731.19
European Union	EUR/USD	0.88	0.90	0.90	0.89	0.89	0.88	0.88	0.87	0.86	0.86	0.85
Japan	JPY/USD	110.54	108.73	108.73	106.34	103.86	101.24	98.69	96.20	93.78	91.42	89.12
Korea	KRW/USD	1 131.94	1 169.60	1 169.60	1 163.23	1 157.73	1 151.87	1 146.04	1 140.25	1 134.48	1 128.74	1 123.03
Mexico	MXN/USD	19.08	19.02	19.02	19.15	19.28	19.41	19.55	19.68	19.82	19.96	20.10
New Zealand	NZD/USD	1.46	1.58	1.58	1.56	1.54	1.53	1.51	1.49	1.48	1.46	1.45
Brazil	BRL/USD	3.59	3.98	3.98	4.05	4.11	4.17	4.23	4.29	4.35	4.41	4.48
China	CNY/USD	6.77	7.07	7.07	7.05	7.04	7.02	7.01	7.00	6.99	6.97	6.96
Egypt	EGP/USD	16.69	17.52	18.64	20.04	21.49	22.54	23.64	24.80	26.02	27.29	28.63
India	INR/USD	68.52	72.61	73.95	75.32	76.63	77.96	79.31	80.68	82.08	83.51	84.96
Indonesia	'000 IDR/USD	14.11	14.48	14.57	14.75	14.93	15.11	15.29	15.47	15.65	15.84	16.03
Malaysia	MYR/USD	4.17	4.23	4.23	4.22	4.22	4.22	4.21	4.21	4.20	4.20	4.20
Pakistan	PKR/USD	106.38	121.55	130.94	137.36	141.56	145.78	150.13	154.60	159.21	163.95	168.84
Russia	RUB/USD	61.97	63.71	63.71	65.08	66.18	67.12	68.07	69.03	70.01	71.00	72.01
Saudi Arabia	SAR/USD	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
South Africa	ZAR/USD	13.61	14.72	15.15	15.59	16.04	16.47	16.92	17.39	17.86	18.35	18.85
Ukraine	UAH/USD	26.85	27.72	28.70	29.67	30.64	31.61	32.62	33.65	34.72	35.82	36.96
United Kingdom	GBP/USD	0.77	0.78	0.78	0.78	0.77	0.77	0.76	0.76	0.76	0.75	0.75

Table C.10. Economic assumptions *(cont.)*

Calendar year

		2019est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
POPULATION[1]												
Australia	%	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9
Canada	%	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
Chile	%	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5
European Union	%	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	%	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5
Korea	%	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Mexico	%	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8
New Zealand	%	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6
Norway	%	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Switzerland	%	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Turkey	%	1.3	1.1	0.8	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.6
United Kingdom	%	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
United States	%	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
Argentina	%	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8
Brazil	%	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4
China	%	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1
Egypt	%	1.8	1.8	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4
India	%	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
Indonesia	%	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7
Iran	%	1.0	0.9	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4
Malaysia	%	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0
Pakistan	%	1.9	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.5
Russia	%	0.1	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3
Saudi Arabia	%	1.7	1.7	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.1	1.1
South Africa	%	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8
Ukraine	%	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.6
OECD[3]	%	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
World	%	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
REAL GDP PER CAPITA[1]												
Australia	%	1.0	1.1	1.2	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7
Canada	%	1.2	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0
Chile	%	1.8	2.3	2.5	2.6	2.6	2.5	2.5	2.6	2.6	2.6	2.6
European Union	%	1.6	1.0	1.1	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9
Japan	%	1.5	0.9	1.1	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.1
Korea	%	2.4	2.2	2.3	2.8	2.8	2.9	2.9	3.0	3.0	3.0	3.0
Mexico	%	0.3	0.2	0.5	1.1	1.3	1.4	1.5	1.5	1.5	1.6	1.6
New Zealand	%	1.8	1.7	1.6	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8
Norway	%	0.8	1.6	1.4	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9
Switzerland	%	1.0	0.6	0.3	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1
Turkey	%	2.1	1.9	2.2	2.4	3.0	3.1	3.1	3.0	3.0	2.9	2.9
United Kingdom	%	0.9	0.5	0.7	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2
United States	%	1.9	1.4	1.4	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8
Brazil	%	0.2	0.9	1.1	1.7	1.8	1.7	1.7	1.7	1.8	1.8	1.8
China	%	6.0	5.3	5.1	5.4	5.3	5.3	5.3	5.3	5.4	5.4	5.4
Egypt	%	3.0	4.0	4.2	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.5
India	%	5.5	5.9	6.3	6.4	6.4	6.3	6.4	6.4	6.4	6.4	6.5
Indonesia	%	4.0	4.0	4.2	4.3	4.4	4.4	4.4	4.4	4.5	4.5	4.5
Iran	%	-6.5	-3.2	-1.9	-1.8	-1.8	-1.6	-1.5	-1.5	-1.4	-1.4	-1.4
Malaysia	%	3.6	3.1	3.6	3.5	3.5	3.6	3.7	3.7	3.8	3.8	3.9
Pakistan	%	2.7	0.5	1.2	2.7	3.3	3.3	3.3	3.4	3.4	3.5	3.5
Russia	%	1.5	1.5	1.4	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1
Saudi Arabia	%	-1.2	0.5	0.6	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4
South Africa	%	-0.3	-0.1	0.3	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9
Ukraine	%	3.4	3.5	3.7	3.7	3.9	3.9	3.9	3.9	3.9	3.9	4.0
OECD[3]	%	1.6	1.2	1.2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7

Note: For OECD member countries, as well as Brazil, China and Russia, historical data for real GDP, private consumption expenditure deflator and GDP deflator were obtained from the OECD Economic Outlook No. 106, November 2019. For other economies, historical macroeconomic data were obtained from the IMF, World Economic Outlook, October 2019. Assumptions for the projection period draw on the recent medium term update of the OECD Economics Department, projections of the IMF, and for population, projections from the United Nations World Population Prospects Database, 2019 Revision (medium variant). Data for the European Union are euro area aggregates except for population. The price index used is the private consumption expenditure deflator. Average 2017-19est and 2019est: Data for 2019 are estimated.

1. Annual per cent change.
2. Annual weighted average real GDP and CPI growth rates in OECD countries are based on weights using purchasing power parities (PPPs).
3. Excludes Iceland but includes all EU member countries.
4. Short-term update for crude oil price from the OECD Economic Outlook N°106 (November 2019). For 2019, the annual average monthly spot price is used, while the average daily spot price for December 2019 is used as the oil price value for the year 2020 and oil prices during the projection period are expected to remain flat in real terms.
5. World Bank. Data for 2019 are estimated, projections by OECD and FAO Secretariats.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.11. World prices

Nominal price

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CEREALS												
Wheat[1]	USD/t	225.4	217.0	218.8	222.4	227.9	232.1	236.4	240.7	244.8	249.1	253.4
Maize[2]	USD/t	165.2	168.1	171.3	174.5	178.2	181.1	184.3	187.7	190.8	194.1	197.6
Other coarse grains[3]	USD/t	196.9	188.6	193.2	197.3	204.6	209.7	214.2	218.0	221.7	225.7	229.6
Rice[4]	USD/t	428.7	435.3	431.8	434.1	441.3	449.4	455.7	462.2	467.5	472.3	476.2
Distiller's dry grains[5]	USD/t	130.3	134.2	136.4	139.1	142.3	144.9	147.9	150.9	153.7	156.7	159.8
OILSEEDS												
Soybean[6]	USD/t	384.4	394.6	404.4	412.7	420.6	429.0	439.7	447.7	455.9	465.0	474.3
Other oilseeds[7]	USD/t	426.6	431.2	448.4	457.0	461.6	471.0	479.6	487.6	494.6	502.0	509.8
Protein meals[8]	USD/t	323.6	315.3	319.3	326.5	334.3	341.2	349.3	357.4	364.7	373.1	381.7
Vegetable oils[9]	USD/t	724.0	775.7	800.0	818.9	828.8	845.5	864.6	879.6	893.4	907.2	921.8
SWEETENERS												
Raw sugar[10]	USD/t	286.5	318.9	314.4	323.0	330.7	337.1	344.1	353.9	364.7	375.0	385.7
Refined sugar[11]	USD/t	357.0	399.0	394.4	403.7	409.0	416.6	423.1	432.1	444.2	456.2	468.9
HFCS[12]	USD/t dw	821.7	616.6	519.8	535.2	541.9	550.0	557.3	571.5	588.6	603.9	620.3
Molasses[13]	USD/t	144.7	155.1	158.0	159.7	161.0	161.0	160.3	159.7	160.3	161.9	164.1
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 255.1	4 093.0	4 073.1	4 031.8	3 992.2	3 999.4	4 002.3	4 056.6	4 084.4	4 109.1	4 138.4
Price, United States[15]	USD/t dwt	4 212.7	4 183.8	4 171.0	4 133.4	4 098.5	4 118.2	4 151.7	4 187.6	4 214.0	4 237.7	4 260.8
Price, Brazil[16]	USD/t dwt	4 014.7	4 075.1	4 019.6	3 979.2	3 940.2	3 949.6	3 963.2	4 003.7	4 036.4	4 065.7	4 090.0
Pigmeat												
Price, EU[17]	USD/t dwt	1 778.5	2 046.9	2 016.6	2 013.9	2 001.3	2 010.3	2 025.0	2 042.6	2 053.9	2 069.7	2 077.5
Price, United States[18]	USD/t dwt	1 473.4	1 679.3	1 671.7	1 681.4	1 681.2	1 673.3	1 657.6	1 650.2	1 639.2	1 633.5	1 623.0
Price, Brazil[19]	USD/t dwt	2 233.0	2 532.3	2 455.5	2 445.2	2 439.4	2 447.6	2 461.3	2 479.8	2 488.0	2 507.6	2 512.9
Poultry meat												
Price, EU[20]	USD/t rtc	2 163.1	2 200.4	2 225.2	2 271.0	2 287.6	2 316.7	2 340.8	2 363.6	2 385.4	2 408.1	2 429.3
Price, United States[21]	USD/t rtc	1 191.7	1 147.5	1 163.6	1 187.3	1 195.1	1 209.8	1 220.7	1 233.4	1 245.0	1 257.2	1 269.7
Price, Brazil[22]	USD/t rtc	1 608.7	1 663.5	1 685.3	1 719.6	1 731.5	1 753.3	1 770.6	1 791.0	1 810.0	1 830.2	1 850.6
Sheep meat												
Price, New Zealand[23]	USD/t dwt	4 612.0	4 844.1	4 766.7	4 711.9	4 684.7	4 682.6	4 689.5	4 708.5	4 738.5	4 776.3	4 817.7
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 032.7	3 135.0	3 260.0	3 396.7	3 490.6	3 603.4	3 634.4	3 684.9	3 629.6	3 660.5	3 690.1
Aquaculture[25]	USD/t	3 022.3	3 041.0	3 194.8	3 328.8	3 420.7	3 567.4	3 634.4	3 684.9	3 629.6	3 660.5	3 708.5
Capture[26]	USD/t	1 831.0	1 917.0	1 978.3	2 036.3	2 078.4	2 149.9	2 188.4	2 238.8	2 214.9	2 231.2	2 247.2
Meal[27]	USD/t	1 447.7	1 418.3	1 502.5	1 467.1	1 499.1	1 539.3	1 575.7	1 701.3	1 638.8	1 656.4	1 676.9
Oil[28]	USD/t	1 600.3	1 871.0	1 956.0	1 898.3	1 920.0	1 959.4	2 003.8	2 131.7	2 075.9	2 106.4	2 142.9
DAIRY PRODUCTS												
Butter[29]	USD/t	4 927.1	4 028.3	4 111.5	4 198.8	4 270.0	4 348.1	4 425.4	4 501.8	4 572.8	4 645.6	4 721.6
Cheese[30]	USD/t	3 805.0	3 783.7	3 868.1	3 954.7	4 041.6	4 132.0	4 220.1	4 310.5	4 398.5	4 488.6	4 582.2
Skim milk powder[31]	USD/t	2 219.7	2 912.5	2 997.1	3 061.9	3 136.3	3 206.5	3 271.8	3 338.5	3 404.4	3 471.8	3 538.2
Whole milk powder[32]	USD/t	3 077.6	3 242.6	3 302.1	3 384.6	3 459.0	3 534.4	3 606.4	3 678.8	3 749.6	3 823.6	3 898.3
Whey powder[33]	USD/t	957.5	965.2	976.1	999.3	1 025.7	1 044.6	1 068.1	1 089.1	1 110.0	1 132.3	1 157.9
Casein[34]	USD/t	6 062.1	6 461.6	6 578.8	6 712.8	6 847.5	6 981.8	7 116.1	7 251.4	7 387.1	7 524.2	7 662.2
BIOFUEL												
Ethanol[35]	USD/hl	38.7	39.6	42.7	45.9	47.4	48.2	49.4	49.4	50.0	50.7	51.3
Biodiesel[36]	USD/hl	83.2	81.8	85.8	88.8	90.5	91.2	91.5	92.6	93.8	94.7	95.1
COTTON												
Cotton[37]	USD/t	1 834.4	1 656.6	1 659.8	1 680.7	1 690.0	1 715.2	1 739.2	1 778.9	1 809.7	1 836.0	1 858.1
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	432.1	482.9	492.0	505.2	511.6	520.8	527.5	536.9	543.7	553.6	562.0
USA GDP Deflator (2019=1)	**Index**	**0.981**	**1.022**	**1.044**	**1.065**	**1.087**	**1.109**	**1.132**	**1.155**	**1.178**	**1.203**	**1.227**

Table C.11. World prices *(cont.)*

Real price

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CEREALS												
Wheat[1]	USD/t	230.1	212.3	209.6	208.7	209.7	209.2	208.9	208.5	207.7	207.2	206.5
Maize[2]	USD/t	168.4	164.5	164.1	163.8	163.9	163.3	162.9	162.5	161.9	161.4	161.0
Other coarse grains[3]	USD/t	200.9	184.6	185.1	185.2	188.2	189.1	189.2	188.7	188.1	187.7	187.1
Rice[4]	USD/t	437.3	426.0	413.5	407.4	406.0	405.1	402.6	400.2	396.8	392.8	388.1
Distiller's dry grains[5]	USD/t	132.9	131.4	130.6	130.6	130.9	130.7	130.7	130.7	130.4	130.3	130.3
OILSEEDS												
Soybean[6]	USD/t	392.3	386.1	387.3	387.4	386.9	386.7	388.5	387.7	386.9	386.7	386.6
Other oilseeds[7]	USD/t	435.1	421.9	429.5	429.0	424.6	424.6	423.8	422.2	419.7	417.5	415.5
Protein meals[8]	USD/t	330.6	308.6	305.8	306.5	307.5	307.6	308.6	309.5	309.5	310.3	311.1
Vegetable oils[9]	USD/t	738.6	759.1	766.2	768.6	762.4	762.3	763.9	761.6	758.1	754.5	751.3
SWEETENERS												
Raw sugar[10]	USD/t	292.1	312.1	301.1	303.2	304.2	303.9	304.0	306.4	309.5	311.9	314.4
Refined sugar[11]	USD/t	364.0	390.4	377.7	379.0	376.3	375.6	373.8	374.2	376.9	379.4	382.1
HFCS[12]	USD/t dw	839.3	603.4	497.9	502.3	498.5	495.8	492.4	494.9	499.5	502.3	505.5
Molasses[13]	USD/t	147.5	151.8	151.4	149.9	148.1	145.1	141.6	138.3	136.1	134.6	133.8
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 342.5	4 005.5	3 900.9	3 784.4	3 672.5	3 605.7	3 536.2	3 512.6	3 465.9	3 417.3	3 372.8
Price, United States[15]	USD/t dwt	4 298.8	4 094.3	3 994.6	3 879.7	3 770.3	3 712.7	3 668.2	3 626.0	3 576.0	3 524.2	3 472.6
Price, Brazil[16]	USD/t dwt	4 095.5	3 987.9	3 849.7	3 735.1	3 624.7	3 560.8	3 501.6	3 466.8	3 425.2	3 381.1	3 333.4
Pigmeat												
Price, EU[17]	USD/t dwt	1 814.1	2 003.1	1 931.3	1 890.3	1 841.0	1 812.4	1 789.2	1 768.7	1 742.9	1 721.2	1 693.2
Price, United States[18]	USD/t dwt	1 503.7	1 643.4	1 601.0	1 578.2	1 546.5	1 508.5	1 464.5	1 428.9	1 391.0	1 358.5	1 322.8
Price, Brazil[19]	USD/t dwt	2 279.9	2 478.2	2 351.7	2 295.2	2 244.0	2 206.7	2 174.7	2 147.2	2 111.3	2 085.4	2 048.1
Poultry meat												
Price, EU[20]	USD/t rtc	2 206.2	2 153.3	2 131.1	2 131.7	2 104.4	2 088.6	2 068.2	2 046.6	2 024.2	2 002.6	1 979.9
Price, United States[21]	USD/t rtc	1 216.5	1 122.9	1 114.4	1 114.4	1 099.4	1 090.6	1 078.6	1 068.0	1 056.5	1 045.5	1 034.8
Price, Brazil[22]	USD/t rtc	1 641.4	1 627.9	1 614.1	1 614.1	1 592.8	1 580.7	1 564.4	1 550.8	1 535.9	1 522.1	1 508.3
Sheep meat												
Price, New Zealand[23]	USD/t dwt	4 697.8	4 740.5	4 565.1	4 422.7	4 309.5	4 221.6	4 143.4	4 077.1	4 021.0	3 972.1	3 926.4
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 093.3	3 067.9	3 122.1	3 188.3	3 211.0	3 248.7	3 211.1	3 190.7	3 080.0	3 044.2	3 007.4
Aquaculture[25]	USD/t	3 082.9	2 975.9	3 059.7	3 124.5	3 146.8	3 216.2	3 211.1	3 190.7	3 080.0	3 044.2	3 022.5
Capture[26]	USD/t	1 867.6	1 876.0	1 894.6	1 911.3	1 912.0	1 938.3	1 933.5	1 938.5	1 879.6	1 855.5	1 831.5
Meal[27]	USD/t	1 476.1	1 387.9	1 438.9	1 377.1	1 379.0	1 387.8	1 392.2	1 473.1	1 390.6	1 377.5	1 366.7
Oil[28]	USD/t	1 630.8	1 831.0	1 873.3	1 781.9	1 766.2	1 766.5	1 770.4	1 845.8	1 761.6	1 751.8	1 746.5
DAIRY PRODUCTS												
Butter[29]	USD/t	5 032.4	3 942.1	3 937.7	3 941.1	3 928.0	3 920.0	3 910.0	3 898.1	3 880.4	3 863.4	3 848.2
Cheese[30]	USD/t	3 881.3	3 702.8	3 704.6	3 712.1	3 718.0	3 725.2	3 728.6	3 732.4	3 732.5	3 732.9	3 734.5
Skim milk powder[31]	USD/t	2 260.6	2 850.2	2 870.4	2 874.1	2 885.1	2 890.8	2 890.7	2 890.8	2 888.9	2 887.3	2 883.6
Whole milk powder[32]	USD/t	3 139.4	3 173.2	3 162.5	3 176.9	3 182.0	3 186.4	3 186.4	3 185.5	3 181.9	3 179.8	3 177.2
Whey powder[33]	USD/t	977.6	944.6	934.8	937.9	943.6	941.8	943.7	943.0	941.9	941.6	943.7
Casein[34]	USD/t	6 189.1	6 323.4	6 300.7	6 300.9	6 299.1	6 294.4	6 287.4	6 278.9	6 268.6	6 257.3	6 244.8
BIOFUEL												
Ethanol[35]	USD/hl	39.5	38.7	40.9	43.1	43.6	43.4	43.7	42.8	42.5	42.1	41.8
Biodiesel[36]	USD/hl	84.9	80.1	82.1	83.3	83.2	82.2	80.9	80.2	79.6	78.7	77.5
COTTON												
Cotton[37]	USD/t	1 873.1	1 621.2	1 589.6	1 577.5	1 554.6	1 546.3	1 536.6	1 540.3	1 535.7	1 526.9	1 514.3
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	439.9	472.6	471.2	474.2	470.6	469.5	466.1	464.9	461.4	460.4	458.0

Note: This table is a compilation of price information presented in the detailed commodity tables further in this annex. Prices for crops are on marketing year basis and those for products on calendar year basis. See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated. Real prices are deflated using USA GDP base year 2018=1.

1. No.2 hard red winter wheat, ordinary protein, United States FOB Gulf Ports (June/May).
2. No.2 yellow corn, United States FOB Gulf Ports (September/August).
3. Feed barley, Europe, FOB Rouen (July/June).
4. Milled 100%, grade b, nominal price quote, FOB Bangkok (January/December).
5. Wholesale price, Central Illinois (September/August).
6. Soybean, U.S., CIF Rotterdam (October/September).
7. Rapeseed, Europe, CIF Hamburg (October/September).
8. Weighted average meal price, European port (October/September).
9. Weighted average price of oilseed oils and palm oil, European port (October/September).
10. Raw sugar world price, ICE contract No11 nearby (October/September).
11. Refined sugar price,Euronext,Liffe,Contract No. 407 London, Europe (October/September).
12. United States wholesale spot price for HFCS-55, dry weight (October/September).
13. Unit import price, Europe (October/September).
14. EU average beef producer price.
15. Choice steers, 1100-1300 lb lw, Nebraska - lw to dwt conversion factor 0.63.
16. Brazil: frozen beef, export unit value, product weight.
17. EU average pigmeat producer price.
18. Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota - lw to dwt conversion factor 0.74.
19. Brazil: frozen pigmeat, export unit value, product weight.
20. EU average producer price.
21. Wholesale weighted average broiler price 12 cities average prior 2013. National composite wholesale, broiler.
22. Brazil: export unit value for chicken (FOB), product weight.
23. New Zealand lamb price carcass weight, all grade average.
24. World unit value of trade (sum of exports and imports).
25. World unit value of aquaculture fisheries production (live weight basis).
26. FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction.
27. Fishmeal, 64-65% protein, Hamburg, Germany.
28. Fish oil any origin, N.W. Europe.
29. FOB export price, butter, 82% butterfat, Oceania.
30. FOB export price, cheddar cheese, 39% moisture, Oceania.
31. FOB export price, non-fat dry milk, 1.25% butterfat, Oceania.
32. FOB export price, WMP 26% butterfat, Oceania.
33. FOB export price, sweet whey non-hygroscopic, Western Europe.
34. Export price, New Zealand.
35. Wholesale price, United States, Omaha.
36. Producer price Germany net of biodiesel tariff and energy tax.
37. Cotlook A index, Middling 1 1/8", c.f.r. far Eastern ports (August/July).
38. Thailand, Bangkok, Cassava (flour), wholesale.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.12.1. World trade projections, imports

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Wheat												
World Trade	**kt**	**172 945**	**184 180**	**188 911**	**192 416**	**196 133**	**199 104**	**201 803**	**204 528**	**207 101**	**209 810**	**212 482**
OECD[1]	kt	38 621	38 919	39 152	39 078	39 107	39 224	39 266	39 320	39 349	39 505	39 618
Developing countries	kt	142 228	154 037	158 660	162 109	165 746	168 694	171 377	174 066	176 622	179 234	181 846
Least Developed Countries	kt	17 255	19 126	19 569	20 138	20 718	21 284	21 862	22 450	23 050	23 656	24 280
Maize												
World Trade	**kt**	**160 262**	**163 226**	**167 128**	**170 518**	**174 401**	**177 834**	**181 050**	**184 267**	**187 545**	**190 852**	**194 305**
OECD[1]	kt	78 161	77 402	80 124	81 122	81 748	82 639	83 486	84 293	85 138	85 983	86 850
Developing countries	kt	117 349	121 421	123 575	126 796	130 639	133 846	136 849	139 902	142 999	146 117	149 395
Least Developed Countries	kt	3 659	3 570	3 496	3 480	3 522	3 609	3 691	3 763	3 837	3 907	3 975
Other coarse grains												
World Trade	**kt**	**36 158**	**38 001**	**38 476**	**38 692**	**39 115**	**39 616**	**40 116**	**40 759**	**41 336**	**41 937**	**42 575**
OECD[1]	kt	7 444	7 614	7 658	7 669	7 641	7 663	7 679	7 707	7 709	7 730	7 759
Developing countries	kt	29 395	31 078	31 643	31 943	32 430	32 970	33 514	34 190	34 807	35 434	36 091
Least Developed Countries	kt	662	698	657	637	689	752	835	965	1 096	1 206	1 313
Rice												
World Trade	**kt**	**46 985**	**48 744**	**50 261**	**51 301**	**52 519**	**54 014**	**55 556**	**57 020**	**58 599**	**60 190**	**61 858**
OECD[1]	kt	6 422	6 608	6 673	6 725	6 793	6 858	6 934	7 006	7 076	7 147	7 222
Developing countries	kt	40 808	42 393	43 871	44 858	46 007	47 445	48 927	50 327	51 844	53 368	54 967
Least Developed Countries	kt	10 923	10 977	11 632	12 183	12 784	13 588	14 367	15 184	16 045	16 941	17 889
Soybean												
World Trade	**kt**	**149 088**	**149 264**	**155 561**	**157 835**	**160 046**	**162 146**	**163 976**	**166 214**	**168 348**	**170 451**	**172 540**
OECD[1]	kt	29 822	30 274	30 460	30 690	30 897	31 012	30 983	31 026	31 039	31 051	31 061
Developing countries	kt	126 084	126 079	132 369	134 613	136 796	138 952	140 968	143 340	145 631	147 891	150 135
Least Developed Countries	kt	1 284	1 563	1 602	1 636	1 666	1 695	1 721	1 749	1 778	1 805	1 833
Other oilseeds												
World Trade	**kt**	**21 144**	**20 999**	**21 328**	**21 525**	**21 845**	**22 190**	**22 491**	**22 773**	**23 079**	**23 384**	**23 692**
OECD[1]	kt	12 260	12 015	12 093	12 171	12 283	12 336	12 328	12 316	12 311	12 307	12 309
Developing countries	kt	11 008	11 074	11 354	11 510	11 754	12 079	12 423	12 755	13 107	13 458	13 807
Least Developed Countries	kt	246	223	240	249	265	282	297	314	332	350	369
Protein meals												
World Trade	**kt**	**89 890**	**91 908**	**92 134**	**92 840**	**93 623**	**94 389**	**95 124**	**95 946**	**96 690**	**97 442**	**98 161**
OECD[1]	kt	48 317	48 099	48 372	48 291	48 298	48 279	48 317	48 350	48 426	48 474	48 538
Developing countries	kt	49 632	52 008	52 165	53 099	54 001	54 930	55 772	56 694	57 505	58 350	59 151
Least Developed Countries	kt	889	872	909	945	992	1 039	1 087	1 138	1 186	1 230	1 281
Vegetable oils												
World Trade	**kt**	**84 555**	**87 424**	**88 530**	**89 548**	**90 838**	**91 969**	**93 174**	**94 313**	**95 472**	**96 688**	**97 915**
OECD[1]	kt	23 411	22 828	22 731	22 455	22 417	22 260	22 211	22 023	21 734	21 493	21 260
Developing countries	kt	62 761	66 266	67 466	68 758	70 085	71 375	72 633	73 963	75 416	76 879	78 345
Least Developed Countries	kt	7 548	8 012	8 235	8 477	8 735	8 987	9 233	9 491	9 752	10 014	10 274
Sugar												
World Trade	**kt**	**56 570**	**58 063**	**60 039**	**60 841**	**61 263**	**62 091**	**62 946**	**63 822**	**64 790**	**65 909**	**67 075**
OECD[1]	kt	11 568	11 921	11 855	11 823	11 567	11 382	11 203	11 133	11 073	11 047	11 006
Developing countries	kt	44 753	46 140	48 213	49 007	49 671	50 705	51 776	52 699	53 718	54 881	56 100
Least Developed Countries	kt	9 868	10 036	10 659	11 025	11 332	11 765	12 237	12 726	13 279	13 879	14 513
Beef[2]												
World Trade	**kt**	**10 102**	**10 682**	**10 763**	**10 804**	**10 862**	**10 918**	**10 990**	**11 131**	**11 258**	**11 379**	**11 496**
OECD[1]	kt	4 349	4 408	4 483	4 529	4 578	4 617	4 662	4 691	4 723	4 751	4 778
Developing countries	kt	6 079	6 678	6 694	6 698	6 714	6 739	6 773	6 896	7 002	7 106	7 206
Least Developed Countries	kt	172	158	167	174	183	193	207	217	230	244	259
Pigmeat[2]												
World Trade	**kt**	**9 213**	**10 419**	**9 946**	**9 731**	**9 682**	**9 655**	**9 635**	**9 612**	**9 652**	**9 674**	**9 725**
OECD[1]	kt	5 339	5 470	5 514	5 572	5 627	5 679	5 717	5 754	5 792	5 830	5 874
Developing countries	kt	5 352	6 634	6 115	5 832	5 736	5 667	5 620	5 572	5 586	5 582	5 600
Least Developed Countries	kt	155	168	180	197	211	225	242	260	279	299	321
Poultry meat												
World Trade	**kt**	**13 552**	**14 285**	**14 391**	**14 504**	**14 627**	**14 776**	**14 939**	**15 164**	**15 401**	**15 647**	**15 897**
OECD[1]	kt	4 106	4 274	4 335	4 381	4 405	4 428	4 459	4 468	4 478	4 494	4 505
Developing countries	kt	9 089	9 709	9 831	9 928	10 054	10 191	10 333	10 563	10 791	11 030	11 278
Least Developed Countries	kt	933	981	1 033	1 078	1 125	1 171	1 217	1 261	1 305	1 346	1 388
Sheep meat[2]												
World Trade	**kt**	**1 169**	**1 223**	**1 233**	**1 244**	**1 255**	**1 261**	**1 266**	**1 272**	**1 280**	**1 289**	**1 297**
OECD[1]	kt	469	453	449	450	449	448	446	446	445	444	444
Developing countries	kt	717	788	803	814	824	832	839	846	855	865	874
Least Developed Countries	kt	4	4	4	4	4	4	4	4	4	4	5

Table C.12.1. World trade projections, imports *(cont.)*

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Butter												
World Trade	**kt**	**997**	**1 062**	**1 080**	**1 092**	**1 104**	**1 116**	**1 128**	**1 140**	**1 153**	**1 166**	**1 179**
OECD[1]	kt	311	344	348	349	348	346	345	344	344	344	344
Developing countries	kt	610	656	676	691	706	721	736	752	768	784	800
Least Developed Countries	kt	17	18	19	19	19	20	20	21	21	22	22
Cheese												
World Trade	**kt**	**3 116**	**3 255**	**3 305**	**3 357**	**3 406**	**3 454**	**3 503**	**3 552**	**3 599**	**3 647**	**3 696**
OECD[1]	kt	1 682	1 733	1 758	1 783	1 802	1 821	1 840	1 859	1 879	1 899	1 920
Developing countries	kt	1 433	1 488	1 520	1 554	1 592	1 631	1 670	1 709	1 746	1 785	1 824
Least Developed Countries	kt	29	33	34	35	37	39	41	44	46	49	52
Whole milk powder												
World Trade	**kt**	**2 637**	**2 677**	**2 704**	**2 720**	**2 747**	**2 775**	**2 805**	**2 835**	**2 866**	**2 897**	**2 929**
OECD[1]	kt	153	151	147	140	139	137	136	134	133	132	132
Developing countries	kt	2 502	2 532	2 564	2 586	2 614	2 643	2 674	2 705	2 737	2 768	2 800
Least Developed Countries	kt	230	238	244	250	258	265	273	281	289	297	305
Skim milk powder												
World Trade	**kt**	**2 672**	**2 736**	**2 779**	**2 841**	**2 896**	**2 954**	**3 014**	**3 075**	**3 137**	**3 201**	**3 265**
OECD[1]	kt	615	658	651	657	661	666	671	676	681	687	692
Developing countries	kt	2 317	2 386	2 438	2 498	2 554	2 613	2 673	2 735	2 796	2 860	2 924
Least Developed Countries	kt	154	164	170	177	184	192	200	208	216	224	233
Fish												
World Trade	**kt**	**42 928**	**43 942**	**43 979**	**44 483**	**44 830**	**45 221**	**45 469**	**45 672**	**46 118**	**46 404**	**46 721**
OECD	kt	23 164	23 055	23 037	23 310	23 356	23 463	23 459	23 588	23 647	23 734	23 883
Developing countries	kt	20 345	21 283	21 415	21 713	21 981	22 279	22 538	22 672	23 048	23 172	23 329
Least Developed Countries	kt	1 435	1 544	1 547	1 572	1 594	1 613	1 636	1 656	1 690	1 720	1 739
Fishmeal[3]												
World Trade	**kt**	**3 253**	**3 241**	**3 098**	**3 184**	**3 189**	**3 276**	**3 287**	**3 190**	**3 309**	**3 320**	**3 379**
OECD	kt	1 084	1 208	1 107	1 145	1 122	1 139	1 130	1 075	1 138	1 121	1 121
Developing countries	kt	2 388	2 285	2 244	2 278	2 308	2 387	2 409	2 375	2 431	2 466	2 533
Least Developed Countries	kt	33	26	26	26	27	28	29	29	30	31	32
Fish oil[3]												
World Trade	**kt**	**841**	**910**	**901**	**938**	**960**	**973**	**987**	**982**	**1 012**	**1 041**	**1 050**
OECD	kt	679	753	741	772	788	796	805	798	821	844	850
Developing countries	kt	284	293	294	305	317	324	331	329	342	355	362
Least Developed Countries	kt	4	3	3	3	3	3	3	3	3	3	3
Ethanol												
World Trade	**kt**	**11 148**	**10 603**	**10 483**	**10 385**	**10 235**	**10 129**	**10 028**	**9 924**	**9 847**	**9 765**	**9 687**
OECD[1]	kt	6 687	7 064	7 020	6 972	6 847	6 764	6 681	6 586	6 506	6 415	6 321
Developing countries	kt	5 381	4 573	4 476	4 419	4 396	4 375	4 360	4 353	4 359	4 369	4 388
Least Developed Countries	kt	5	1	1	1	1	1	1	1	1	1	1
Biodiesel												
World Trade	**kt**	**6 838**	**7 053**	**6 855**	**6 739**	**6 493**	**6 272**	**6 082**	**5 907**	**5 738**	**5 585**	**5 412**
OECD[1]	kt	5 952	5 832	5 665	5 565	5 325	5 105	4 921	4 753	4 587	4 438	4 274
Developing countries	kt	886	1 221	1 190	1 173	1 167	1 167	1 161	1 155	1 150	1 147	1 138
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
World Trade	**kt**	**9 097**	**9 164**	**9 469**	**9 803**	**10 055**	**10 207**	**10 409**	**10 559**	**10 760**	**10 966**	**11 186**
OECD[1]	kt	1 446	1 413	1 474	1 492	1 520	1 540	1 564	1 585	1 607	1 634	1 660
Developing countries	kt	8 689	8 759	9 047	9 388	9 646	9 797	9 999	10 147	10 349	10 553	10 773
Least Developed Countries	kt	1 669	1 691	1 760	1 831	1 906	1 978	2 054	2 127	2 207	2 290	2 379
Roots and tubers												
World Trade	**kt**	**16 915**	**17 414**	**17 861**	**18 136**	**18 484**	**18 822**	**19 176**	**19 529**	**19 914**	**20 300**	**20 728**
OECD[1]	kt	2 986	3 005	3 044	3 049	3 065	3 068	3 077	3 090	3 100	3 113	3 117
Developing countries	kt	14 547	14 984	15 400	15 677	16 003	16 346	16 689	17 034	17 412	17 793	18 221
Least Developed Countries	kt	222	218	224	226	239	253	277	312	371	462	619

Note: The values do not add up to world trade due to double counting of certains countries and statistical differences (i.e. LDC are already included in the Developing countries aggregate). Average 2017-19est: Data for 2019 are estimated.

1. Excludes Iceland but includes all EU member countries.
2. Excludes trade of live animals.
3. Data are in product weight.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.12.2. World trade projections, exports

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Wheat												
OECD[1]	kt	90 707	99 713	101 095	102 071	103 329	104 388	105 451	106 513	107 577	108 700	109 832
Developing countries	kt	23 983	24 518	24 571	24 578	24 808	25 241	25 541	25 842	26 146	26 523	26 888
Least Developed Countries	kt	111	105	104	102	100	98	96	95	93	91	90
Maize												
OECD[1]	kt	60 812	59 240	60 875	62 049	63 263	64 354	65 187	66 052	66 933	67 819	68 809
Developing countries	kt	66 125	68 140	69 917	71 493	73 300	74 798	76 269	77 699	79 141	80 610	82 105
Least Developed Countries	kt	3 169	3 336	3 420	3 454	3 428	3 351	3 287	3 236	3 190	3 153	3 122
Other coarse grains												
OECD[1]	kt	25 379	25 920	26 019	25 970	26 292	26 633	26 857	27 232	27 448	27 652	27 897
Developing countries	kt	4 967	4 910	4 964	4 922	4 795	4 714	4 667	4 622	4 623	4 649	4 683
Least Developed Countries	kt	702	717	758	773	697	628	559	484	439	415	400
Rice												
OECD[1]	kt	3 977	4 168	4 234	4 275	4 301	4 348	4 367	4 405	4 463	4 506	4 563
Developing countries	kt	43 136	44 664	46 135	47 152	48 332	49 766	51 275	52 683	54 186	55 715	57 309
Least Developed Countries	kt	4 607	4 536	4 976	5 412	5 927	6 169	6 436	6 704	6 990	7 311	7 639
Soybean												
OECD[1]	kt	55 661	52 011	57 047	57 776	58 484	59 166	59 570	60 232	60 990	61 775	62 599
Developing countries	kt	88 581	93 721	94 924	96 382	97 803	99 142	100 485	101 978	103 277	104 516	105 701
Least Developed Countries	kt	31	21	20	19	19	19	19	18	18	18	18
Other oilseeds												
OECD[1]	kt	13 546	13 800	14 103	14 142	14 406	14 669	14 866	15 045	15 252	15 457	15 662
Developing countries	kt	2 754	2 540	2 499	2 540	2 555	2 587	2 626	2 668	2 709	2 752	2 799
Least Developed Countries	kt	148	170	155	150	143	141	141	138	136	132	129
Protein meals												
OECD[1]	kt	19 807	19 306	19 050	19 000	18 929	18 873	18 804	18 734	18 645	18 565	18 474
Developing countries	kt	63 513	64 689	65 058	65 646	66 349	67 000	67 615	68 328	68 985	69 636	70 266
Least Developed Countries	kt	350	379	372	371	364	358	353	348	346	343	340
Vegetable oils												
OECD[1]	kt	8 854	8 500	8 621	8 678	8 804	8 876	8 945	9 015	9 074	9 133	9 192
Developing countries	kt	67 872	70 323	71 160	71 945	72 952	73 846	74 807	75 707	76 637	77 622	78 621
Least Developed Countries	kt	479	467	453	439	425	411	399	387	376	365	355
Sugar												
OECD[1]	kt	9 347	8 512	8 680	8 663	8 764	9 013	9 210	9 388	9 581	9 695	9 789
Developing countries	kt	50 568	52 804	54 808	55 601	55 855	56 367	56 959	57 528	58 177	59 068	60 009
Least Developed Countries	kt	2 291	1 527	1 301	1 191	1 035	940	826	721	658	615	579
Beef[2]												
OECD[1]	kt	5 096	5 131	5 160	5 177	5 211	5 241	5 321	5 413	5 498	5 571	5 644
Developing countries	kt	4 995	5 546	5 587	5 633	5 629	5 643	5 638	5 676	5 711	5 754	5 801
Least Developed Countries	kt	11	11	11	10	10	10	10	10	9	9	9
Pigmeat[2]												
OECD[1]	kt	8 437	9 478	8 916	8 656	8 613	8 583	8 570	8 553	8 601	8 625	8 680
Developing countries	kt	1 123	1 296	1 303	1 312	1 311	1 307	1 297	1 286	1 271	1 261	1 250
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Poultry meat												
OECD[1]	kt	7 067	7 393	7 399	7 402	7 426	7 455	7 497	7 579	7 661	7 751	7 845
Developing countries	kt	7 319	7 687	7 761	7 858	7 950	8 069	8 189	8 330	8 483	8 635	8 786
Least Developed Countries	kt	23	26	25	25	24	24	23	23	23	22	22
Sheep meat[2]												
OECD[1]	kt	1 114	1 126	1 140	1 156	1 168	1 174	1 178	1 181	1 187	1 194	1 200
Developing countries	kt	78	69	66	62	60	59	59	58	58	58	58
Least Developed Countries	kt	3	2	2	2	2	2	2	2	2	2	2
Butter												
OECD[1]	kt	831	843	863	882	899	915	930	945	959	973	986
Developing countries	kt	106	117	114	107	101	96	92	88	86	84	83
Least Developed Countries	kt	2	2	2	2	2	2	2	2	2	1	1
Cheese												
OECD[1]	kt	2 466	2 523	2 577	2 632	2 679	2 729	2 779	2 827	2 874	2 921	2 968
Developing countries	kt	518	500	495	494	496	495	494	494	494	494	495
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Whole milk powder												
OECD[1]	kt	1 872	1 921	1 940	1 947	1 967	1 989	2 012	2 036	2 061	2 085	2 110
Developing countries	kt	664	732	740	748	752	757	761	766	770	775	779
Least Developed Countries	kt	8	7	7	7	7	7	7	6	6	6	6
Skim milk powder												
OECD[1]	kt	2 382	2 400	2 435	2 498	2 551	2 608	2 668	2 728	2 789	2 851	2 914
Developing countries	kt	288	308	309	307	306	305	303	302	301	301	300
Least Developed Countries	kt	5	4	4	4	4	4	4	3	3	3	3

Table C.12.2. World trade projections, exports *(cont.)*

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fish[3]												
OECD	kt	13 189	13 486	13 449	13 549	13 677	13 798	13 858	13 845	14 037	14 141	14 224
Developing countries	kt	27 725	27 390	27 543	28 142	28 480	28 916	29 258	29 517	30 024	30 386	30 803
Least Developed Countries	kt	1 889	1 934	1 950	1 933	1 923	1 918	1 911	1 910	1 894	1 884	1 888
Fishmeal[4]												
OECD	kt	816	892	829	839	848	865	885	881	895	914	918
Developing countries	kt	2 273	2 233	2 114	2 212	2 209	2 300	2 307	2 194	2 335	2 341	2 404
Least Developed Countries	kt	172	163	167	170	172	174	178	182	184	186	187
Fish oil[4]												
OECD	kt	462	520	513	507	518	514	526	536	529	542	544
Developing countries	kt	457	458	452	483	499	505	513	500	529	552	555
Least Developed Countries	kt	40	41	42	42	43	43	43	44	44	45	45
Ethanol												
OECD[1]	kt	7 034	6 729	6 574	6 446	6 282	6 160	6 048	5 936	5 851	5 769	5 694
Developing countries	kt	3 306	3 526	3 563	3 592	3 604	3 619	3 630	3 636	3 644	3 645	3 642
Least Developed Countries	kt	1	1	1	1	1	1	1	1	1	1	1
Biodiesel												
OECD[1]	kt	2 626	2 721	2 531	2 450	2 272	2 112	1 971	1 845	1 734	1 641	1 555
Developing countries	kt	3 530	3 349	3 342	3 305	3 236	3 176	3 127	3 078	3 019	2 960	2 872
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
OECD[1]	kt	4 650	4 363	4 498	4 627	4 779	4 853	4 952	5 015	5 099	5 180	5 277
Developing countries	kt	4 200	4 667	4 855	5 075	5 204	5 302	5 424	5 528	5 664	5 808	5 951
Least Developed Countries	kt	1 120	1 264	1 306	1 350	1 395	1 441	1 490	1 541	1 593	1 646	1 699
Roots and tubers												
OECD[1]	kt	1 710	1 741	1 726	1 743	1 756	1 787	1 813	1 831	1 861	1 880	1 916
Developing countries	kt	11 469	11 786	12 241	12 493	12 828	13 135	13 464	13 799	14 156	14 524	14 917
Least Developed Countries	kt	134	144	141	141	136	132	126	120	114	108	103

Note: Average 2017-19est: Data for 2019 are estimated.

1. Excludes Iceland but includes all EU member countries.
2. Excludes trade of live animals.
3. Data are in live weight equivalent and refer to trade of food fish i.e. for human consumption.
4. Data are in product weight.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.13.1. Wheat projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**752 549**	**838 510**	**1.61**	**1.02**	**172 945**	**212 482**	**2.94**	**1.54**	**173 130**	**212 482**	**3.04**	**1.54**
NORTH AMERICA	81 946	88 273	-0.14	0.34	3 709	3 706	1.25	0.75	48 940	51 280	-0.10	0.36
Canada	31 642	34 863	2.86	0.70	107	112	6.79	-0.15	23 384	25 217	3.59	0.72
United States	50 304	53 411	-1.62	0.11	3 602	3 595	1.10	0.78	25 556	26 063	-2.59	0.02
LATIN AMERICA	31 663	37 063	2.67	1.28	24 496	26 558	1.65	0.60	15 301	18 309	5.38	1.01
Argentina	19 516	22 249	6.54	1.00	3	3	0.00	0.00	13 320	15 731	12.46	0.99
Brazil	5 280	6 518	-0.38	1.72	7 135	7 434	-0.18	0.33	425	527	-17.13	0.00
Chile	1 440	1 721	0.22	1.57	1 248	1 082	6.55	-1.19	1	0	..	..
Colombia	5	8	-17.63	2.17	1 785	2 006	3.22	1.39	9	6	13.16	-1.37
Mexico	3 246	3 974	-1.02	1.89	4 968	5 525	3.10	0.58	848	1 159	6.17	2.42
Paraguay	1 029	1 163	-4.26	1.46	1	1	-34.62	-0.12	409	559	-8.44	1.54
Peru	192	251	-2.00	2.47	2 108	2 437	2.85	1.36	10	9	7.65	-1.21
EUROPE	260 386	290 898	3.14	1.01	10 152	9 199	0.20	-0.76	81 018	107 181	10.01	1.97
European Union[1]	133 555	138 702	1.07	0.39	5 635	5 826	-1.41	0.04	24 969	33 053	2.24	0.85
United Kingdom	14 742	17 302	0.51	1.21	1 941	1 198	4.65	-2.88	713	1 504	-11.79	4.09
Russia	77 880	90 891	7.73	1.49	273	335	36.24	1.23	36 661	44 720	22.08	2.12
Ukraine	26 255	34 098	5.19	1.96	26	15	-11.17	0.13	17 052	25 136	18.14	2.88
AFRICA	27 721	29 663	1.97	0.91	47 571	62 681	2.23	2.15	1 032	1 039	-3.29	0.29
Egypt	8 667	10 068	1.19	1.47	12 467	15 321	2.83	1.43	0	0	..	..
Ethiopia	4 760	5 138	6.41	0.60	1 400	2 954	4.44	6.25	0	0	-53.63	..
Nigeria	70	92	-7.57	1.41	4 667	5 910	2.03	2.12	600	487	3.68	-2.08
South Africa	1 736	1 876	0.23	0.16	1 725	2 159	-0.67	3.00	113	285	-11.27	9.92
ASIA	331 867	365 602	1.30	1.11	86 120	109 357	4.22	1.70	16 219	16 937	-0.21	1.67
China[2]	133 119	135 982	1.64	0.61	3 453	9 632	8.91	4.73	346	208	-4.49	-1.77
India	100 190	115 488	1.92	1.49	553	3	9.49	-2.12	512	607	-3.81	3.25
Indonesia	0	0	..	..	11 148	13 606	8.17	1.97	92	82	14.42	-1.93
Iran	13 467	13 132	4.33	-0.15	64	3 150	-30.95	7.74	195	1	-4.49	22.03
Japan	842	898	2.55	0.45	5 795	5 595	-0.65	-0.12	0	0	..	..
Kazakhstan	13 417	15 136	0.29	1.39	60	60	281.33	0.39	7 700	8 400	0.37	1.86
Korea	26	21	-5.39	1.49	3 981	5 497	-2.36	1.90	50	55	0.00	0.77
Malaysia	0	0	..	..	1 544	1 694	1.16	0.53	139	142	8.07	-0.53
Pakistan	25 648	30 184	0.87	1.56	6	6	-42.10	-0.60	830	824	-0.08	7.09
Philippines	0	0	..	..	6 803	9 263	9.80	2.11	46	40	556.62	-2.06
Saudi Arabia	403	690	-26.58	-0.15	3 177	3 575	5.26	1.88	0	0	..	..
Thailand	1	2	0.65	7.17	3 077	4 281	6.45	2.15	15	12	6.05	-2.11
Turkey	20 167	23 699	-0.37	1.44	6 235	5 437	6.65	-1.68	4 552	5 034	7.49	1.70
Viet Nam	0	0	..	..	4 173	5 338	9.70	2.68	45	37	72.08	-2.61
OCEANIA	18 967	27 011	-4.50	2.04	896	981	3.95	1.07	10 620	17 737	-8.36	3.33
Australia	18 580	26 571	-4.55	2.06	30	28	11.21	0.11	10 620	17 737	-8.36	3.33
New Zealand	387	440	-1.49	1.00	537	576	6.40	1.07	0	0	-23.63	..
DEVELOPED COUNTRIES	**388 579**	**438 111**	**1.63**	**0.97**	**30 717**	**30 636**	**0.64**	**0.16**	**149 147**	**185 594**	**3.23**	**1.61**
DEVELOPING COUNTRIES	**363 970**	**400 399**	**1.58**	**1.08**	**142 228**	**181 846**	**3.48**	**1.80**	**23 983**	**26 888**	**2.05**	**1.10**
LEAST DEVELOPED COUNTRIES (LDC)	8 641	10 309	1.26	1.65	17 255	24 280	5.79	2.71	111	90	-2.43	-1.76
OECD[3]	**275 947**	**302 701**	**0.07**	**0.66**	**38 621**	**39 618**	**1.30**	**0.17**	**90 707**	**109 832**	**-0.76**	**1.06**
BRICS	**318 205**	**350 755**	**2.90**	**1.14**	**13 139**	**19 563**	**2.19**	**2.52**	**38 056**	**46 347**	**14.57**	**2.12**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.13.2. Wheat projections: Consumption, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**747 447**	**833 844**	**1.41**	**1.00**	**511 511**	**562 625**	**1.25**	**0.84**	**67.3**	**66.6**	**0.08**	**-0.09**
NORTH AMERICA	39 090	40 595	-0.63	0.22	29 035	29 996	0.35	0.35	79.7	77.2	-0.38	-0.22
Canada	8 726	9 733	0.74	0.76	2 962	3 075	0.97	0.39	79.9	75.8	-0.04	-0.40
United States	30 364	30 862	-0.99	0.06	26 073	26 922	0.28	0.35	79.7	77.4	-0.42	-0.20
LATIN AMERICA	40 657	45 256	1.69	0.98	35 960	40 244	1.48	1.01	55.8	57.2	0.42	0.23
Argentina	5 865	6 523	1.30	0.94	5 265	5 916	1.16	1.04	118.7	121.5	0.15	0.20
Brazil	11 991	13 405	1.24	1.00	11 414	12 827	1.17	1.04	54.5	57.5	0.33	0.50
Chile	2 811	2 801	3.85	0.37	1 992	2 024	1.13	0.02	109.5	103.6	0.28	-0.60
Colombia	1 854	1 994	3.26	1.40	1 692	1 807	2.70	1.40	34.2	34.2	1.77	0.82
Mexico	7 382	8 351	0.99	1.05	6 395	7 334	2.21	1.22	50.7	52.5	0.95	0.31
Paraguay	497	596	0.87	1.44	360	414	1.62	1.28	52.3	53.3	0.31	0.21
Peru	2 287	2 674	2.60	1.46	2 150	2 501	2.81	1.42	66.1	68.6	1.51	0.40
EUROPE	189 177	192 301	0.61	0.38	80 280	80 616	0.14	0.03	107.5	108.4	-0.03	0.10
European Union[1]	112 517	110 965	0.34	0.21	49 424	49 726	0.12	0.06	111.2	112.4	-0.02	0.14
United Kingdom	15 603	17 023	1.58	0.68	6 897	7 726	1.19	1.08	102.7	110.0	0.50	0.70
Russia	43 298	46 373	2.29	0.83	14 680	14 468	0.31	-0.17	100.7	100.6	0.11	0.00
Ukraine	9 180	8 984	-4.46	-0.30	4 657	4 104	-1.36	-1.28	105.8	99.0	-0.87	-0.73
AFRICA	75 560	91 009	2.70	1.75	63 884	78 185	2.60	1.81	50.1	47.4	0.01	-0.52
Egypt	21 599	25 340	2.29	1.50	18 500	21 969	2.22	1.49	186.2	186.1	0.13	-0.04
Ethiopia	6 244	8 074	5.76	2.32	5 110	6 717	5.14	2.38	47.5	49.1	2.51	0.19
Nigeria	4 144	5 508	1.59	2.59	3 942	5 264	2.99	2.62	20.1	20.4	0.32	0.10
South Africa	3 311	3 745	0.76	1.15	3 249	3 705	1.09	1.15	56.6	57.9	-0.25	0.20
ASIA	392 727	454 454	1.71	1.22	299 580	330 462	1.34	0.85	66.1	67.3	0.33	0.14
China[2]	125 475	143 464	0.48	0.96	91 167	94 680	0.41	0.25	63.9	64.7	-0.11	0.06
India	97 798	113 729	2.61	1.27	81 128	90 371	1.49	0.92	59.9	60.2	0.30	0.01
Indonesia	11 101	13 501	8.27	2.00	6 997	8 649	3.28	1.99	26.2	29.5	2.07	1.14
Iran	14 743	16 280	0.87	0.99	13 643	14 865	1.20	0.73	166.4	168.0	0.01	0.10
Japan	6 525	6 496	-0.38	-0.13	5 178	5 000	-0.54	-0.29	40.7	41.2	-0.39	0.16
Kazakhstan	6 454	6 775	-1.07	0.93	2 614	2 863	1.12	0.79	142.1	142.0	-0.31	0.00
Korea	3 891	5 461	-2.48	1.81	2 442	2 519	0.63	0.29	47.7	49.2	0.25	0.30
Malaysia	1 455	1 550	3.08	0.60	1 015	1 047	2.05	0.15	31.7	28.7	0.43	-1.01
Pakistan	25 691	29 349	1.38	1.43	24 949	28 792	2.01	1.41	124.2	119.6	-0.04	-0.20
Philippines	6 690	9 195	9.66	2.12	2 560	3 189	2.32	1.86	24.0	25.7	0.70	0.49
Saudi Arabia	3 633	4 212	1.27	1.47	3 307	3 899	2.50	1.50	98.6	99.8	0.02	0.18
Thailand	3 030	4 224	7.70	2.17	1 145	1 284	2.20	0.96	16.6	18.4	1.85	0.92
Turkey	22 122	24 069	0.84	0.72	17 162	18 435	1.53	0.51	209.6	209.7	-0.03	0.01
Viet Nam	4 333	5 293	11.41	2.73	1 662	2 121	4.39	2.34	17.2	20.1	3.27	1.52
OCEANIA	10 237	10 227	4.58	0.52	2 773	3 121	1.44	1.05	68.5	67.7	-0.08	-0.11
Australia	8 988	8 838	4.90	0.44	2 043	2 303	1.43	1.06	82.1	82.5	-0.01	0.05
New Zealand	918	1 016	3.43	1.04	415	462	1.29	0.97	87.5	89.9	0.27	0.25
DEVELOPED COUNTRIES	**273 790**	**282 305**	**0.47**	**0.45**	**134 447**	**137 970**	**0.33**	**0.24**	**94.5**	**94.6**	**-0.10**	**0.04**
DEVELOPING COUNTRIES	**473 657**	**551 539**	**1.99**	**1.30**	**377 064**	**424 655**	**1.59**	**1.04**	**61.0**	**60.8**	**0.24**	**-0.05**
LEAST DEVELOPED COUNTRIES (LDC)	26 736	34 353	4.39	2.37	22 698	29 643	4.14	2.51	26.3	26.9	1.73	0.28
OECD[3]	**225 455**	**231 833**	**0.46**	**0.39**	**124 709**	**129 623**	**0.58**	**0.36**	**90.3**	**90.5**	**0.02**	**0.07**
BRICS	**281 874**	**320 716**	**1.50**	**1.05**	**201 639**	**216 051**	**0.88**	**0.56**	**63.1**	**63.6**	**0.06**	**0.03**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.14.1. Maize projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**1 122 085**	**1 315 199**	**3.03**	**1.43**	**160 262**	**194 305**	**6.52**	**1.93**	**158 527**	**194 305**	**6.58**	**1.93**
NORTH AMERICA	374 808	409 688	2.22	0.71	3 134	2 800	5.40	-1.19	56 112	62 522	5.50	1.46
Canada	13 795	15 350	1.74	0.95	2 169	1 770	12.28	-1.81	1 621	1 786	4.80	2.12
United States	361 013	394 338	2.24	0.70	965	1 030	-0.22	-0.03	54 491	60 736	5.66	1.44
LATIN AMERICA	183 982	228 587	4.93	1.79	37 832	44 727	7.33	1.76	60 012	77 429	9.13	2.47
Argentina	51 153	63 606	10.87	1.84	4	4	0.00	0.00	28 176	34 057	11.68	1.43
Brazil	88 506	113 762	3.87	2.00	962	639	5.20	-3.53	28 907	38 908	8.90	3.22
Chile	1 012	1 134	-5.24	1.58	2 119	2 034	12.72	2.25	22	20	-16.74	-0.87
Colombia	1 242	1 686	-4.10	2.84	5 253	6 320	6.11	1.56	1	1	-0.84	-0.12
Mexico	26 998	29 807	3.64	0.67	16 572	19 679	10.18	1.91	1 057	1 300	24.82	3.78
Paraguay	5 097	6 868	6.07	2.88	12	10	-3.63	-0.10	1 715	2 970	-3.68	5.61
Peru	1 537	1 907	-0.72	2.10	3 758	5 437	9.91	3.44	10	10	5.23	-0.44
EUROPE	121 107	138 763	2.96	1.31	21 505	23 509	10.89	1.21	34 481	47 702	12.20	2.40
European Union[1]	67 002	69 778	0.49	0.79	18 213	20 382	11.61	1.37	3 488	4 817	2.62	3.17
United Kingdom	0	0	..	..	2 360	2 500	9.38	0.62	0	0	..	..
Russia	12 542	17 935	12.78	2.82	40	101	-6.15	4.06	4 512	8 331	40.66	3.53
Ukraine	31 490	38 908	8.12	1.47	44	39	-1.69	-0.14	24 574	30 965	14.13	1.78
AFRICA	79 974	96 628	2.30	1.66	22 486	30 240	5.84	3.40	3 912	3 535	-5.01	-1.75
Egypt	7 283	7 740	0.11	0.30	9 433	13 059	6.24	3.71	0	0	..	..
Ethiopia	9 096	10 139	6.92	1.05	0	0	-83.96	..	800	54	4.22	-24.71
Nigeria	11 039	12 775	3.45	1.32	400	1 426	15.95	14.72	150	80	-5.99	-6.59
South Africa	12 238	13 916	0.40	1.37	395	466	-3.29	-0.28	1 690	1 703	-4.00	0.28
ASIA	361 621	440 831	3.24	1.96	75 229	92 911	5.48	1.87	3 947	3 033	-5.26	-2.44
China[2]	259 005	314 027	3.10	2.08	4 152	7 198	7.87	3.45	23	17	-14.92	4.01
India	28 127	34 403	3.32	1.72	116	111	44.32	-0.85	824	399	-22.40	-5.42
Indonesia	26 361	33 653	5.23	1.52	705	246	-18.65	2.66	192	203	26.37	-0.70
Iran	1 074	1 292	-7.35	1.32	9 094	12 149	13.20	2.51	0	0	..	..
Japan	0	0	..	..	15 710	15 636	0.24	-0.01	0	0	..	..
Kazakhstan	858	1 111	8.44	1.44	5	5	105.34	2.23	55	187	25.77	4.77
Korea	74	69	-0.48	-0.91	9 970	11 365	2.68	0.91	0	0	..	..
Malaysia	81	100	3.76	1.70	3 758	4 457	2.63	2.05	19	16	12.88	-2.01
Pakistan	6 170	7 864	6.11	2.12	18	37	5.42	4.85	33	15	189.06	-6.26
Philippines	7 796	9 612	1.64	2.00	674	806	31.61	1.64	0	0	..	..
Saudi Arabia	84	102	-0.24	1.36	4 561	6 160	12.43	1.67	0	0	..	..
Thailand	4 983	6 270	0.10	2.00	322	562	2.41	1.80	207	187	-0.69	-1.51
Turkey	5 867	6 970	4.13	1.47	2 667	3 573	20.09	3.07	70	66	19.90	-0.61
Viet Nam	4 986	5 331	0.55	0.37	9 594	15 393	31.04	4.66	255	171	52.18	-4.15
OCEANIA	594	701	-0.80	0.81	77	117	54.10	1.42	63	84	-2.93	1.42
Australia	397	471	-0.56	0.69	2	2	17.50	0.00	59	80	-2.54	1.49
New Zealand	187	217	-1.25	1.01	73	115	85.54	1.54	3	4	-6.76	0.00
DEVELOPED COUNTRIES	**511 386**	**566 435**	**2.34**	**0.87**	**42 913**	**44 909**	**5.14**	**0.59**	**92 402**	**112 199**	**6.76**	**1.83**
DEVELOPING COUNTRIES	**610 699**	**748 764**	**3.66**	**1.88**	**117 349**	**149 395**	**7.05**	**2.37**	**66 125**	**82 105**	**6.83**	**2.07**
LEAST DEVELOPED COUNTRIES (LDC)	41 888	53 328	3.67	2.10	3 659	3 975	15.03	1.50	3 169	3 122	2.50	-1.06
OECD[3]	**477 819**	**520 071**	**2.00**	**0.73**	**78 161**	**86 850**	**6.19**	**1.14**	**60 812**	**68 809**	**5.29**	**1.60**
BRICS	**400 418**	**494 043**	**3.40**	**2.04**	**5 665**	**8 515**	**6.47**	**2.44**	**35 956**	**49 358**	**6.16**	**3.05**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.14.2. Maize projections: Consumption, feed, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FEED (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**1 141 538**	**1 313 210**	**3.39**	**1.24**	**675 123**	**791 278**	**3.82**	**1.65**	**18.7**	**19.5**	**0.77**	**0.40**
NORTH AMERICA	325 458	349 712	1.60	0.64	144 807	163 427	2.19	1.22	18.3	17.2	-0.80	-0.63
Canada	14 575	15 323	2.68	0.52	9 170	9 649	4.10	0.95	37.9	28.0	-4.08	-3.01
United States	310 883	334 390	1.55	0.64	135 637	153 779	2.07	1.24	16.1	15.9	-0.06	-0.10
LATIN AMERICA	162 917	195 242	4.40	1.52	107 299	128 673	4.95	1.68	53.5	55.5	0.61	0.34
Argentina	22 853	29 448	10.97	2.35	17 112	22 659	13.20	2.51	36.2	37.1	1.44	0.20
Brazil	61 490	75 206	2.59	1.36	44 724	52 728	1.99	1.47	24.6	24.9	0.34	0.12
Chile	3 014	3 106	3.57	1.47	2 419	2 487	4.36	1.48	21.4	23.7	0.59	1.00
Colombia	6 401	7 983	3.66	1.85	3 999	5 112	3.32	2.36	47.4	53.1	3.67	0.42
Mexico	42 413	48 125	5.49	1.08	23 853	26 931	9.70	0.99	135.9	140.5	0.05	0.32
Paraguay	3 493	3 843	14.81	1.51	686	753	5.91	2.32	54.3	53.8	-0.56	0.37
Peru	5 288	7 321	5.81	3.08	4 557	6 540	6.24	3.32	15.9	16.5	2.09	0.48
EUROPE	105 851	114 541	1.90	0.76	82 416	89 253	1.94	0.73	8.9	9.1	0.85	0.20
European Union[1]	79 907	85 348	1.77	0.67	62 375	66 577	1.94	0.56	10.5	10.6	0.06	0.07
United Kingdom	2 219	2 558	9.86	0.70	890	1 133	6.86	1.58	11.4	12.9	10.27	0.25
Russia	8 005	9 674	8.06	1.97	6 280	8 027	6.81	2.43	1.4	1.5	3.72	0.86
Ukraine	7 737	7 979	0.23	0.31	5 934	6 061	0.75	0.22	10.7	11.3	-0.47	0.56
AFRICA	98 394	122 740	3.46	2.20	33 814	43 897	4.05	2.59	40.2	39.9	0.10	-0.07
Egypt	16 583	20 743	3.05	2.34	11 850	15 580	3.59	2.90	41.6	38.4	-0.50	-0.65
Ethiopia	8 013	10 059	6.89	1.89	1 567	1 989	14.63	2.14	47.2	48.2	1.87	0.02
Nigeria	10 949	14 061	4.01	2.23	2 067	2 408	11.10	1.79	31.7	31.1	-0.75	0.00
South Africa	11 744	12 655	1.45	1.46	5 282	6 747	0.63	2.35	90.3	86.6	0.08	-0.42
ASIA	448 308	530 241	4.86	1.45	306 355	365 465	4.83	1.96	9.4	9.4	0.79	-0.02
China[2]	277 974	321 049	4.92	1.23	191 939	217 681	4.20	1.80	9.9	9.9	1.35	0.00
India	27 467	34 091	6.33	1.84	13 331	18 378	8.25	2.67	6.4	6.3	0.21	-0.22
Indonesia	27 021	33 650	3.38	1.60	12 323	17 080	9.62	2.45	29.6	28.8	0.34	-0.14
Iran	10 002	13 394	8.62	2.38	9 777	13 168	8.85	2.44	0.9	0.8	-1.17	-1.72
Japan	15 769	15 649	0.26	0.01	11 952	11 885	0.72	-0.13	0.8	0.9	0.53	0.45
Kazakhstan	797	926	7.96	1.06	687	796	7.66	1.01	0.5	0.6	-1.41	0.96
Korea	10 298	11 433	3.03	1.01	8 000	9 133	3.59	1.28	2.0	2.0	0.88	0.18
Malaysia	3 773	4 536	2.01	2.06	3 510	4 265	1.72	2.17	2.0	2.0	2.47	0.07
Pakistan	6 439	7 862	7.44	2.14	3 583	4 783	11.74	2.60	8.2	8.5	1.36	0.52
Philippines	8 335	10 392	2.22	1.98	5 583	7 209	1.63	2.32	18.2	17.8	0.70	-0.19
Saudi Arabia	4 632	6 257	12.09	1.67	4 426	6 035	11.68	1.70	0.2	0.2	-2.42	-0.99
Thailand	5 097	6 629	0.79	2.11	4 759	6 293	1.13	2.23	1.2	1.1	-0.35	-0.69
Turkey	8 430	10 448	7.10	2.08	6 516	8 486	8.76	2.55	16.0	16.1	0.21	0.20
Viet Nam	14 760	20 536	13.05	3.46	11 249	16 514	11.68	4.04	7.5	8.7	3.28	1.24
OCEANIA	609	735	1.91	0.84	433	562	3.85	1.07	2.3	2.1	-0.90	-0.92
Australia	341	393	0.05	0.53	189	240	2.75	0.85	3.1	2.9	-0.85	-0.89
New Zealand	256	328	4.54	1.20	241	319	4.54	1.22	1.5	1.5	-1.00	0.04
DEVELOPED COUNTRIES	**463 971**	**498 815**	**1.64**	**0.68**	**248 900**	**276 813**	**2.03**	**1.03**	**13.3**	**13.3**	**0.29**	**-0.03**
DEVELOPING COUNTRIES	**677 568**	**814 395**	**4.73**	**1.61**	**426 224**	**514 465**	**4.99**	**2.00**	**19.9**	**20.8**	**0.80**	**0.41**
LEAST DEVELOPED COUNTRIES (LDC)	42 504	53 952	4.63	2.29	10 861	14 294	8.19	2.46	27.1	28.5	0.59	0.52
OECD[3]	**496 761**	**537 769**	**2.05**	**0.72**	**267 375**	**298 284**	**2.80**	**1.05**	**24.4**	**25.8**	**0.65**	**0.47**
BRICS	**386 679**	**452 674**	**4.54**	**1.32**	**261 556**	**303 561**	**3.93**	**1.82**	**10.4**	**10.4**	**0.75**	**-0.07**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.15.1. Other coarse grain projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**289 771**	**318 900**	**0.90**	**0.81**	**36 158**	**42 575**	**3.28**	**1.28**	**42 017**	**48 434**	**3.28**	**1.11**
NORTH AMERICA	26 334	27 569	2.01	0.18	1 556	1 662	-1.56	0.37	9 293	9 287	3.06	0.26
Canada	13 143	13 795	2.25	0.19	59	67	5.10	0.88	5 620	5 697	3.39	0.30
United States	13 191	13 775	1.81	0.17	1 497	1 594	-1.73	0.35	3 673	3 589	2.71	0.19
LATIN AMERICA	19 337	22 685	-1.67	1.34	1 753	1 761	-11.21	0.41	3 402	4 015	-4.64	1.53
Argentina	7 136	8 422	-2.29	1.14	1	1	0.00	0.00	3 196	3 732	-4.89	1.43
Brazil	3 367	4 079	2.73	1.52	628	730	12.06	1.77	4	3	-6.87	0.23
Chile	787	905	0.59	1.63	94	126	-23.30	1.24	42	48	-9.31	-1.16
Colombia	22	30	-15.69	2.71	319	347	-9.10	0.54	0	0	..	..
Mexico	5 648	6 414	-4.25	1.34	435	350	-20.02	-0.84	1	2	19.32	0.99
Paraguay	108	129	-3.35	1.78	0	0	..	..	2	1	-1.11	-3.04
Peru	253	297	-0.33	1.77	163	143	4.19	-1.04	36	42	392.88	1.05
EUROPE	127 861	136 231	1.09	0.41	2 368	2 196	1.27	-1.27	20 049	24 747	6.47	1.94
European Union[1]	78 489	82 796	0.54	0.08	1 544	1 587	5.33	-0.04	8 824	9 981	2.69	1.19
United Kingdom	7 691	7 441	2.88	-0.13	202	248	-0.12	0.84	1 043	969	3.97	-1.62
Russia	26 088	27 669	4.30	0.87	59	63	-24.10	0.08	5 486	6 961	15.61	2.43
Ukraine	9 753	11 598	-0.21	1.57	17	17	-12.97	-0.10	4 525	6 411	8.16	2.75
AFRICA	55 425	65 466	1.96	1.69	3 840	5 725	6.57	3.43	1 341	540	-1.34	-10.64
Egypt	969	1 157	-0.18	1.64	36	19	-11.59	-2.68	0	0	..	..
Ethiopia	13 347	16 483	4.27	2.26	0	0	-77.22	..	495	10	3.37	-36.02
Nigeria	8 114	9 373	-1.13	1.32	20	21	0.00	0.43	100	84	0.00	-1.30
South Africa	563	638	2.01	1.26	214	222	9.28	-0.51	24	29	-1.15	0.43
ASIA	49 059	53 288	0.07	0.85	26 531	31 103	5.56	1.22	1 771	2 247	8.33	-1.35
China[2]	10 076	11 450	1.88	1.60	10 106	11 364	20.03	0.39	90	100	-7.28	2.67
India	17 270	16 008	-2.60	-0.30	182	513	89.59	1.53	136	38	-12.89	-0.76
Indonesia	0	0	..	..	65	79	-6.83	1.68	0	0	..	..
Iran	2 982	3 610	0.37	1.84	2 750	4 229	19.46	3.56	0	0	..	..
Japan	218	220	0.76	-0.34	2 047	1 796	-6.10	-1.43	0	0	..	..
Kazakhstan	4 412	5 083	11.73	0.21	31	10	-2.83	1.79	1 522	2 089	23.01	-1.53
Korea	107	104	3.68	-1.23	114	122	2.44	0.60	0	0	..	..
Malaysia	0	0	..	..	14	15	291.09	2.01	0	0	..	..
Pakistan	514	620	-0.10	1.67	134	162	33.86	2.68	0	0	..	..
Philippines	1	0	8.39	..	39	52	0.45	2.21	0	0	..	..
Saudi Arabia	210	231	6.39	1.38	7 426	8 933	-0.26	2.13	0	0	..	..
Thailand	171	220	0.37	2.45	24	4	0.00	-16.92	2	3	-0.16	3.55
Turkey	7 951	9 404	-0.18	1.52	466	712	18.35	4.53	14	10	-8.96	-0.68
Viet Nam	3	4	9.67	1.69	100	113	6.04	1.23	0	0	..	..
OCEANIA	11 753	13 659	0.41	1.09	110	128	4.83	2.38	6 160	7 599	1.53	1.75
Australia	11 366	13 206	0.47	1.10	0	0	..	..	6 160	7 599	1.53	1.75
New Zealand	384	448	-1.26	0.79	25	23	20.91	0.56	0	0	..	..
DEVELOPED COUNTRIES	**173 257**	**186 004**	**1.42**	**0.44**	**6 763**	**6 485**	**-2.17**	**-0.70**	**37 050**	**43 751**	**4.87**	**1.34**
DEVELOPING COUNTRIES	**116 514**	**132 895**	**0.18**	**1.35**	**29 395**	**36 091**	**4.98**	**1.68**	**4 967**	**4 683**	**-4.48**	**-0.80**
LEAST DEVELOPED COUNTRIES (LDC)	26 588	31 475	2.62	1.56	662	1 313	1.63	8.70	702	400	-3.87	-7.87
OECD[3]	**140 098**	**149 586**	**0.64**	**0.32**	**7 444**	**7 759**	**-5.23**	**0.18**	**25 379**	**27 897**	**2.46**	**0.90**
BRICS	**57 364**	**59 844**	**1.18**	**0.72**	**11 189**	**12 892**	**17.10**	**0.49**	**5 739**	**7 130**	**12.15**	**2.40**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.15.2. Other coarse grain projections: Consumption, feed, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FEED (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**282 625**	**312 361**	**0.40**	**0.80**	**144 919**	**158 855**	**-0.09**	**0.88**	**10.4**	**10.5**	**-0.16**	**0.22**
NORTH AMERICA	18 846	19 920	0.20	0.15	11 439	12 267	-0.38	0.07	4.2	4.1	-0.11	-0.20
Canada	7 740	8 164	0.08	0.07	7 075	7 561	-0.08	0.14	7.7	7.1	-0.77	-0.78
United States	11 106	11 756	0.25	0.20	4 364	4 707	-1.00	-0.04	3.8	3.8	-0.01	-0.09
LATIN AMERICA	17 675	20 405	-1.96	1.14	11 616	13 607	-4.48	1.39	3.8	3.6	-0.23	-0.73
Argentina	3 935	4 687	2.31	0.74	2 235	2 845	0.07	0.93	17.1	18.2	-1.32	-0.01
Brazil	3 991	4 805	4.36	1.55	2 445	2 839	3.22	1.04	1.8	2.2	2.31	1.92
Chile	845	977	-4.61	1.23	513	612	-8.33	1.46	4.0	4.5	2.83	1.00
Colombia	344	376	-9.81	0.69	20	32	-35.56	2.07	0.6	0.4	-9.81	-1.08
Mexico	6 048	6 759	-6.78	1.22	5 265	6 099	-7.76	1.70	6.2	4.7	2.31	-3.52
Paraguay	106	128	-3.40	1.86	93	107	-4.53	1.95	0.0	0.0	-2.21	-1.07
Peru	381	398	-0.15	0.73	23	34	-3.26	3.25	6.2	5.3	-0.01	-0.61
EUROPE	109 873	113 591	-0.59	0.05	70 930	68 529	-0.65	-0.24	13.5	13.4	-0.87	-0.07
European Union[1]	70 576	74 374	-0.61	-0.09	44 139	41 359	-1.01	-0.68	10.0	10.0	-0.20	0.15
United Kingdom	6 926	6 726	2.02	0.13	3 843	3 695	2.31	0.26	36.0	36.3	0.47	0.10
Russia	20 748	20 714	0.46	0.44	14 630	14 973	1.45	0.61	12.4	11.7	-3.58	-0.87
Ukraine	5 151	5 199	-5.40	0.14	3 410	3 487	-5.56	0.28	17.0	15.9	-2.73	-0.74
AFRICA	57 149	70 265	1.93	1.94	8 572	10 802	0.48	1.96	31.8	31.0	-0.14	-0.12
Egypt	1 005	1 173	-0.60	1.57	650	782	-1.05	1.93	3.0	2.7	-1.72	-0.66
Ethiopia	12 500	16 324	4.02	2.54	600	657	2.64	0.76	92.2	100.4	1.04	0.89
Nigeria	8 001	9 302	-2.16	1.35	273	317	-16.65	1.60	37.2	32.7	-1.80	-1.20
South Africa	760	829	3.74	0.68	130	178	0.57	2.27	2.6	2.4	-1.37	-1.01
ASIA	73 286	81 995	1.71	1.06	38 258	49 213	3.21	2.56	5.3	4.8	-1.36	-0.89
China[2]	20 218	22 769	8.19	0.94	7 900	12 225	27.37	5.11	3.3	3.0	0.98	-0.66
India	17 426	16 485	-1.54	-0.24	790	590	2.87	0.01	11.9	10.3	-2.16	-1.20
Indonesia	65	79	-6.83	1.68	0	0	0.00	0.00	0.2	0.3	-7.94	0.83
Iran	5 665	7 806	5.90	2.71	5 488	7 630	6.14	2.78	0.3	0.3	-1.17	-1.73
Japan	2 260	2 028	-5.98	-1.31	1 600	1 434	-8.01	-1.43	4.0	4.2	1.93	0.40
Kazakhstan	2 559	2 973	5.34	1.82	1 699	2 142	4.35	2.16	2.5	2.2	-1.41	-1.05
Korea	221	226	2.93	-0.29	59	60	0.55	0.14	3.2	3.2	3.54	-0.43
Malaysia	13	15	268.61	2.12	12	14	321.76	2.15	0.0	0.0	159.37	0.98
Pakistan	648	782	2.85	1.87	198	263	0.24	2.90	2.0	2.0	2.54	-0.17
Philippines	40	52	0.55	2.18	28	38	-1.40	2.25	0.0	0.1	1.17	1.06
Saudi Arabia	7 802	9 095	0.52	2.05	7 606	8 892	0.53	2.10	2.7	2.4	-2.42	-1.00
Thailand	193	220	0.33	1.39	57	69	0.89	2.17	1.4	1.6	-0.49	0.98
Turkey	8 334	10 078	0.17	1.75	7 281	8 977	0.25	1.92	3.6	3.2	-1.54	-0.89
Viet Nam	103	116	6.13	1.25	0	0	0.00	0.00	0.0	0.0	7.01	1.52
OCEANIA	5 796	6 186	-1.23	0.35	4 104	4 437	-1.84	0.41	6.4	6.7	-2.54	-0.09
Australia	5 301	5 607	-1.31	0.28	3 735	4 005	-1.91	0.36	7.4	7.6	-3.81	-0.55
New Zealand	408	470	-0.84	0.78	350	412	-0.97	0.90	1.7	1.6	-1.00	-0.72
DEVELOPED COUNTRIES	**142 494**	**148 559**	**-0.45**	**0.13**	**91 980**	**91 682**	**-0.66**	**-0.07**	**8.9**	**8.6**	**-0.89**	**-0.26**
DEVELOPING COUNTRIES	**140 132**	**163 802**	**1.32**	**1.44**	**52 939**	**67 173**	**0.98**	**2.34**	**10.7**	**10.9**	**-0.04**	**0.27**
LEAST DEVELOPED COUNTRIES (LDC)	26 376	32 200	2.70	1.89	1 650	1 984	5.91	1.35	23.4	23.0	0.39	0.01
OECD[3]	**121 850**	**129 376**	**-0.92**	**0.17**	**79 780**	**80 590**	**-1.60**	**-0.02**	**7.7**	**7.5**	**0.05**	**-0.27**
BRICS	**63 143**	**65 601**	**2.03**	**0.51**	**25 895**	**30 805**	**5.59**	**2.22**	**7.2**	**6.6**	**-1.49**	**-0.86**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.16.1. Rice projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**514 978**	**581 764**	**0.96**	**1.02**	**46 985**	**61 858**	**3.75**	**2.67**	**47 193**	**62 066**	**2.86**	**2.66**
NORTH AMERICA	6 237	7 074	-0.64	0.05	1 294	1 513	3.74	1.31	2 932	3 349	-1.26	0.56
Canada	0	0	..	..	388	462	0.71	1.72	0	0	..	..
United States	6 237	7 074	-0.64	0.05	906	1 052	5.32	1.14	2 932	3 349	-1.26	0.56
LATIN AMERICA	18 469	20 016	0.12	0.77	4 319	4 431	2.89	-0.04	3 449	3 272	1.63	0.70
Argentina	888	893	-1.83	0.31	7	5	-1.61	0.00	399	254	-4.74	-3.13
Brazil	7 897	7 687	-1.10	-0.42	722	655	1.02	-1.22	849	737	0.08	1.08
Chile	111	134	5.30	1.56	151	176	3.09	1.44	4	3	70.42	-0.87
Colombia	1 815	1 998	4.38	0.88	141	209	1.26	1.76	2	1	55.78	-0.13
Mexico	283	215	5.86	-2.18	783	934	2.84	2.20	69	9	32.51	0.00
Paraguay	651	883	13.29	2.43	1	1	3.34	-0.09	618	811	18.00	2.62
Peru	2 190	2 543	1.89	1.80	318	248	10.02	-3.82	67	86	58.80	2.43
EUROPE	2 839	3 008	-0.51	0.60	2 652	2 895	3.52	0.83	676	876	0.59	3.51
European Union[1]	1 758	1 800	-0.30	0.13	1 450	1 648	6.46	1.41	474	631	2.10	3.25
United Kingdom	0	0	..	..	670	681	0.54	0.12	45	25	1.79	-5.00
Russia	1 027	1 149	0.01	1.33	221	240	0.43	0.32	148	214	-2.44	6.53
Ukraine	42	44	-12.22	1.39	82	69	4.51	-1.93	3	2	-17.49	1.81
AFRICA	21 525	25 046	3.18	1.41	17 582	31 208	4.66	5.06	446	189	0.81	-4.00
Egypt	3 744	4 034	0.42	1.54	390	710	24.80	-0.51	48	0	-56.66	..
Ethiopia	109	124	8.35	0.72	522	857	26.35	4.70	0	0	..	..
Nigeria	4 947	6 420	7.98	2.22	2 603	4 589	-0.89	5.58	0	0	..	..
South Africa	2	2	0.00	0.80	937	1 146	1.38	1.98	0	0	..	..
ASIA	465 648	526 285	0.95	1.02	20 579	21 201	3.23	0.81	39 436	54 089	3.64	2.96
China[2]	145 906	150 643	0.78	0.26	3 220	4 414	21.91	2.16	2 011	1 730	21.61	-2.33
India	114 977	135 743	1.72	1.58	4	3	19.79	1.30	11 688	18 768	8.95	3.33
Indonesia	46 634	56 357	1.42	0.92	969	9	-9.80	-16.41	3	6	26.44	3.56
Iran	1 954	2 418	4.22	2.07	1 380	1 371	0.07	-2.36	2	1	21.84	0.19
Japan	7 518	7 440	-0.48	-0.30	744	728	-1.01	-0.08	101	156	-5.15	2.19
Kazakhstan	321	365	4.31	1.42	12	9	-7.82	-0.31	94	85	8.66	0.32
Korea	3 896	3 661	-1.00	-0.50	382	429	0.54	-0.01	56	50	37.04	0.00
Malaysia	1 760	2 072	1.13	1.42	997	1 147	0.21	0.69	19	35	53.86	-0.12
Pakistan	7 315	8 597	3.89	1.30	8	8	-25.61	0.00	4 308	5 069	2.80	1.50
Philippines	12 399	14 331	1.17	1.22	2 575	3 442	11.17	1.08	0	0	-13.80	..
Saudi Arabia	0	0	..	..	1 225	1 500	0.57	1.24	0	0	..	..
Thailand	21 411	23 808	-2.12	1.25	326	548	-3.21	4.61	10 092	11 589	2.02	2.81
Turkey	563	688	1.04	1.59	278	309	1.18	0.61	39	47	-6.54	-0.59
Viet Nam	28 368	32 974	0.60	1.42	597	642	-0.11	2.45	6 725	9 019	-1.70	2.59
OCEANIA	261	335	-23.10	2.01	560	610	3.41	0.29	255	292	-13.91	1.50
Australia	252	323	-24.14	2.02	201	208	4.79	-1.00	254	291	-13.93	1.50
New Zealand	0	0	..	..	50	62	2.39	1.50	0	0	..	..
DEVELOPED COUNTRIES	**17 576**	**18 747**	**-0.88**	**0.10**	**6 177**	**6 891**	**2.56**	**0.93**	**4 057**	**4 758**	**-1.89**	**1.15**
DEVELOPING COUNTRIES	**497 402**	**563 017**	**1.03**	**1.05**	**40 808**	**54 967**	**3.94**	**2.91**	**43 136**	**57 309**	**3.45**	**2.79**
LEAST DEVELOPED COUNTRIES (LDC)	78 229	92 696	1.17	1.45	10 923	17 889	5.82	5.59	4 607	7 639	9.90	5.66
OECD[3]	**22 433**	**23 334**	**-0.55**	**-0.03**	**6 422**	**7 222**	**2.64**	**1.00**	**3 977**	**4 563**	**-1.70**	**0.94**
BRICS	**269 810**	**295 224**	**1.11**	**0.83**	**5 104**	**6 458**	**9.75**	**1.63**	**14 695**	**21 449**	**9.01**	**2.66**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

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2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.16.2. Rice projections: Consumption, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**511 663**	**580 764**	**1.30**	**1.02**	**54.5**	**55.1**	**-0.01**	**-0.02**
NORTH AMERICA	4 782	5 083	0.98	0.19	13.1	13.1	0.25	-0.39
Canada	388	462	0.71	1.72	10.5	11.4	-0.30	0.92
United States	4 394	4 622	1.01	0.05	13.4	13.3	0.31	-0.50
LATIN AMERICA	19 373	21 140	0.36	0.60	28.2	28.3	-0.76	-0.20
Argentina	539	641	3.02	2.09	10.4	10.9	2.54	1.00
Brazil	7 750	7 604	-1.03	-0.59	37.0	34.1	-1.86	-1.12
Chile	260	307	3.76	1.52	12.0	13.4	2.94	1.01
Colombia	1 919	2 200	2.61	0.99	35.2	38.2	1.07	0.40
Mexico	916	1 140	1.61	0.81	7.3	8.2	0.36	-0.09
Paraguay	84	73	5.16	0.51	6.5	5.5	1.65	-0.96
Peru	2 443	2 700	2.21	1.10	65.6	65.9	0.57	0.10
EUROPE	4 841	5 026	1.45	0.29	6.4	6.7	1.32	0.37
European Union[1]	2 747	2 818	2.30	0.23	6.2	6.4	2.16	0.31
United Kingdom	626	655	0.66	0.38	9.3	9.3	-0.02	0.00
Russia	1 112	1 175	0.69	0.40	7.6	8.2	0.50	0.58
Ukraine	121	111	-3.14	-0.82	2.7	2.6	-2.39	-0.32
AFRICA	38 933	55 815	4.28	3.32	26.9	30.8	2.00	1.16
Egypt	4 146	4 736	1.76	1.30	38.4	37.8	0.14	-0.22
Ethiopia	638	977	21.89	4.10	5.3	6.7	18.52	2.12
Nigeria	7 574	10 960	4.95	3.52	33.5	37.7	2.26	1.16
South Africa	933	1 145	1.91	1.96	15.9	17.6	0.83	1.02
ASIA	443 103	493 047	1.12	0.82	77.6	78.1	-0.09	-0.05
China[2]	146 115	153 912	1.45	0.38	76.6	76.5	0.09	0.00
India	99 650	116 872	1.03	1.17	68.5	72.2	-0.07	0.21
Indonesia	47 680	56 073	1.34	1.18	134.0	131.5	-0.04	-0.24
Iran	3 305	3 778	2.42	0.19	35.8	38.2	0.93	-0.47
Japan	8 555	7 843	0.12	-0.78	53.4	51.8	-1.12	-0.21
Kazakhstan	239	288	1.79	1.75	11.5	12.7	0.03	1.00
Korea	4 520	4 039	-0.74	-0.37	61.7	54.1	-2.08	-1.19
Malaysia	2 752	3 180	0.70	1.16	79.8	81.2	-0.26	0.00
Pakistan	3 108	3 526	3.35	1.36	12.5	12.1	0.69	-0.23
Philippines	14 780	17 716	1.94	1.23	118.0	121.1	0.16	-0.20
Saudi Arabia	1 309	1 499	0.88	1.24	38.5	37.9	-1.48	-0.07
Thailand	12 522	12 740	-0.78	0.08	99.0	91.1	-0.04	-1.01
Turkey	794	947	1.44	1.47	9.1	10.1	-0.12	0.99
Viet Nam	22 258	24 552	1.22	1.04	152.9	149.7	-0.72	-0.15
OCEANIA	631	653	-2.69	0.59	15.4	13.9	-4.22	-0.56
Australia	267	239	-7.88	-0.15	10.7	8.6	-9.19	-1.15
New Zealand	50	62	2.39	1.50	10.6	12.1	1.36	0.78
DEVELOPED COUNTRIES	**20 388**	**20 549**	**0.71**	**-0.02**	**13.0**	**12.9**	**-0.19**	**-0.12**
DEVELOPING COUNTRIES	**491 275**	**560 215**	**1.33**	**1.06**	**64.1**	**63.9**	**-0.13**	**-0.14**
LEAST DEVELOPED COUNTRIES (LDC)	83 930	102 603	1.44	1.79	76.2	73.6	-0.17	-0.39
OECD[3]	**25 710**	**25 660**	**0.55**	**-0.04**	**16.1**	**15.7**	**-0.57**	**-0.34**
BRICS	**255 560**	**280 707**	**1.20**	**0.68**	**66.3**	**67.8**	**-0.05**	**0.07**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.17. Main policy assumptions for cereal markets

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Crops export tax	%	8.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Rice export tax	%	8.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
CANADA												
Tariff-quotas[1]												
Wheat	kt	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
In-quota tariff	%	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Out-of-quota tariff	%	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7
Barley	kt	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0
In-quota tariff	%	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Out-of-quota tariff	%	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0
EUROPEAN UNION[2,3]												
Voluntary coupled support												
Wheat[4]	mln EUR	90.0	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7
Rice[5]	mln EUR	55.9	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6
Cereal reference price[6]	EUR/t	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3
Direct payments ceilings[7]	bln EUR	41.6	42.2	42.3	42.3	42.3	42.3	42.3	42.3	42.3	42.3	42.3
Rice reference price[8]	EUR/t	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Wheat tariff-quota[1]	kt	4 513.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2
Coarse grain tariff-quota[1]	kt	4 430.2	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8
JAPAN												
Wheat tariff-quota	kt	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Barley tariff-quota	kt	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Rice tariff-quota	kt	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0
KOREA												
Wheat tariff	%	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Maize tariff-quota	kt	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0
In-quota tariff	%	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Out-of-quota tariff	%	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7
Barley tariff-quota	kt	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4
Rice quota[9]	kt	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7
In-quota tariff	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
MERCOSUR												
Wheat tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grain tariff[10]	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Rice tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
MEXICO												
Barley import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES												
ARC participation rate												
Wheat	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coarse grains	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wheat loan rate	USD/t	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
Maize loan rate	USD/t	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8
CHINA												
Wheat tariff-quota	kt	9 636	9 636	9 636	9 636	9 636	9 636	9 636	9 636	9 636	9 636	9 636
In-quota tariff	%	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Out-of-quota tariff	%	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Coarse grains tariff	%	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Maize tariff-quota	kt	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200	7 200
In-quota tariff	%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Out-of-quota tariff	%	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Rice tariff-quota	kt	5 320	5 320	5 320	5 320	5 320	5 320	5 320	5 320	5 320	5 320	5 320
In-quota tariff	%	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Out-of-quota tariff	%	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7

Table C.17. Main policy assumptions for cereal markets *(cont.)*

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
INDIA												
Minimum support price												
Rice	INR/t	19 706	27 802	28 599	29 434	30 294	31 187	32 095	33 032	33 997	34 990	36 011
Wheat	INR/t	16 918	17 841	18 428	19 032	19 600	20 107	20 502	20 956	21 441	21 940	22 439
Wheat tariff	%	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Rice tariff	%	70.4	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5
RUSSIA												
Wheat ad valorem import tax	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Rice tariff equivalent of import barriers	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grains tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coarse grain specific tariff	RUB/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coarse grain ad valorem import tax	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Year beginning 1 July.
2. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
3. Refers to all current European Union member States (excludes the United Kingdom)
4. Mainly for durum wheat. Implemented in 6 Member States.
5. Implemented in 6 Member States.
6. Buying-in at the fixed reference price is operable automatically only for common wheat up to a maximum quantity of 3 million tons per marketing year. Above that ceiling and for durum wheat, maize and barley intervention can take place only via tender.
7. Estimated net amounts for all direct payments based on Annex II of EU Regulation No 1307/2013, accounting for the transfers between direct aids and rural development envelopes.
8. Intervention is set at zero tonnes per marketing year. However, the Commission may initiate intervention if market requires.
9. Milled rice basis.
10. Applied by Brazil only.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.18.1. Soybean projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**347 325**	**406 214**	**3.96**	**1.26**	**149 088**	**172 540**	**6.55**	**1.46**	**147 873**	**172 540**	**6.42**	**1.46**
NORTH AMERICA	119 509	128 500	3.63	0.76	1 178	947	2.96	1.62	55 254	62 233	4.10	1.59
Canada	7 043	8 092	5.62	3.08	688	538	12.45	3.02	4 998	5 051	7.63	2.32
United States	112 466	120 408	3.52	0.62	490	409	-3.73	0.03	50 256	57 183	3.80	1.53
LATIN AMERICA	182 801	221 205	4.43	1.40	11 504	9 301	11.16	0.63	87 859	105 075	7.78	1.38
Argentina	49 016	61 315	0.27	1.07	3 780	500	930.35	0.00	9 592	11 914	-4.53	1.36
Brazil	118 311	140 157	6.78	1.51	410	410	18.64	0.00	70 042	82 401	10.97	1.37
Chile	0	0	..	..	232	388	4.26	1.39	2	2	96.12	-1.38
Colombia	70	89	-0.17	2.11	873	976	8.32	0.71	20	18	23.18	-0.71
Mexico	396	562	10.62	2.05	4 863	5 455	4.43	0.97	0	0	..	..
Paraguay	9 617	12 457	5.32	1.70	0	0	-80.08	..	5 543	7 312	2.93	1.81
Peru	5	6	0.00	1.97	383	429	22.62	0.92	0	0	..	..
EUROPE	11 127	13 995	11.60	2.23	17 895	17 596	3.40	-0.50	4 017	4 590	16.77	1.88
European Union[1]	2 786	3 970	13.52	3.33	14 096	14 212	2.52	-0.20	270	244	11.87	0.15
United Kingdom	0	0	..	..	758	758	-0.83	0.00	11	11	29.09	0.00
Russia	3 852	5 002	14.83	1.90	2 438	1 911	12.18	-2.97	1 262	1 645	106.80	0.96
Ukraine	4 025	4 493	10.01	1.82	5	5	20.29	-0.14	2 467	2 678	10.97	2.68
AFRICA	2 928	3 674	5.45	1.96	4 684	7 699	10.36	3.08	197	166	2.18	-0.66
Egypt	35	42	0.37	1.50	3 501	5 745	9.85	3.06	50	34	11.03	-2.97
Ethiopia	118	134	20.34	1.09	0	0	-75.42	..	78	80	259.21	0.18
Nigeria	683	864	1.47	2.09	53	51	221.68	-2.53	10	11	40.76	0.64
South Africa	1 342	1 761	9.81	2.17	11	4	12.80	-2.64	12	5	-31.92	2.53
ASIA	30 916	38 790	0.55	1.75	113 825	136 995	6.60	1.72	538	465	1.69	-0.17
China[2]	16 449	21 488	1.73	1.73	87 281	104 504	6.17	1.82	128	150	-12.64	0.00
India	12 178	14 632	-0.67	1.86	60	74	76.02	-0.26	197	129	17.73	1.14
Indonesia	633	701	-4.63	0.74	2 705	3 831	5.73	2.33	2	2	24.10	-0.22
Iran	207	268	2.93	2.50	2 246	2 450	24.14	0.77	60	55	63.78	-0.77
Japan	238	273	1.06	0.95	3 246	3 126	1.07	-0.65	0	0	..	..
Kazakhstan	257	303	8.52	1.40	10	7	-19.25	-1.29	0	0	..	..
Korea	89	73	-4.72	-1.93	1 322	1 486	0.31	0.86	0	0	..	..
Malaysia	0	0	..	..	857	1 006	7.67	1.04	13	9	-2.91	-1.03
Pakistan	2	2	-16.89	1.75	2 590	3 799	36.92	2.64	0	0	..	..
Philippines	1	1	0.00	2.41	227	299	21.33	1.50	0	0	..	..
Saudi Arabia	0	0	..	..	584	742	118.04	1.38	0	0	..	..
Thailand	41	55	-11.08	2.53	2 829	3 362	5.70	1.48	4	3	-12.06	-1.45
Turkey	140	165	3.51	1.47	2 107	2 391	7.62	1.47	95	79	151.00	-1.45
Viet Nam	88	97	-13.13	1.74	1 826	2 396	17.61	2.24	2	2	54.00	-1.10
OCEANIA	45	51	-0.08	2.28	2	2	-1.48	0.05	7	11	15.84	0.67
Australia	45	51	-0.08	2.28	1	1	-2.84	0.09	7	11	15.85	0.67
New Zealand	0	0	..	..	1	1	0.00	0.00	0	0	..	..
DEVELOPED COUNTRIES	**132 521**	**144 887**	**4.20**	**0.91**	**23 004**	**22 405**	**2.95**	**-0.40**	**59 291**	**66 839**	**4.64**	**1.61**
DEVELOPING COUNTRIES	**214 804**	**261 327**	**3.78**	**1.45**	**126 084**	**150 135**	**7.33**	**1.77**	**88 581**	**105 701**	**7.74**	**1.37**
LEAST DEVELOPED COUNTRIES (LDC)	878	1 035	2.68	1.62	1 284	1 833	40.23	1.74	31	18	7.99	-1.73
OECD[3]	**123 277**	**133 686**	**3.79**	**0.83**	**29 822**	**31 061**	**2.96**	**0.26**	**55 661**	**62 599**	**4.14**	**1.58**
BRICS	**152 131**	**183 040**	**5.53**	**1.58**	**90 200**	**106 903**	**6.33**	**1.70**	**71 641**	**84 329**	**11.06**	**1.36**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.18.2. Soybean projections: Consumption, domestic crush

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		DOMESTIC CRUSH (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**348 300**	**406 057**	**3.99**	**1.33**	**312 969**	**368 842**	**4.14**	**1.40**
NORTH AMERICA	63 873	67 240	3.21	0.44	58 661	61 678	3.05	0.43
Canada	2 743	3 572	4.09	4.24	1 942	2 912	3.99	4.84
United States	61 130	63 668	3.17	0.26	56 718	58 766	3.02	0.25
LATIN AMERICA	106 857	125 425	2.75	1.35	99 832	117 138	2.79	1.34
Argentina	43 537	49 908	2.31	0.98	42 543	48 842	2.36	1.00
Brazil	48 679	58 170	2.35	1.69	43 385	51 782	2.32	1.69
Chile	223	386	3.53	1.45	223	386	3.57	1.45
Colombia	922	1 046	8.65	0.85	917	1 041	8.63	0.85
Mexico	5 205	6 016	4.76	0.99	4 968	5 766	5.01	1.01
Paraguay	4 190	5 133	8.67	1.57	4 027	4 935	8.82	1.54
Peru	398	435	20.23	0.93	397	435	20.46	0.93
EUROPE	25 028	27 000	4.88	0.43	22 483	24 331	4.85	0.46
European Union[1]	16 789	17 938	3.83	0.50	14 789	15 872	3.57	0.57
United Kingdom	747	747	-0.97	0.00	667	650	-0.13	-0.39
Russia	4 883	5 269	9.92	0.10	4 796	5 191	9.77	0.10
Ukraine	1 555	1 818	9.29	0.62	1 404	1 639	9.33	0.64
AFRICA	7 338	11 187	8.34	2.78	6 703	10 334	9.64	2.78
Egypt	3 469	5 744	9.29	3.14	3 469	5 744	9.34	3.14
Ethiopia	40	54	6.82	2.61	20	31	5.56	3.99
Nigeria	727	904	2.54	1.78	592	674	9.19	0.87
South Africa	1 265	1 752	13.02	2.18	1 139	1 584	13.07	2.19
ASIA	145 162	175 162	4.99	1.73	125 250	155 321	5.51	1.92
China[2]	104 202	125 716	5.31	1.80	88 153	110 385	5.73	2.09
India	12 320	14 575	-0.61	1.85	10 481	12 321	-0.71	1.83
Indonesia	3 303	4 525	2.98	2.08	2 705	3 741	5.73	1.85
Iran	2 393	2 661	19.94	0.95	2 378	2 644	20.29	0.96
Japan	3 578	3 400	1.18	-0.53	2 771	2 589	2.51	-0.69
Kazakhstan	267	310	5.24	1.33	139	153	2.56	0.88
Korea	1 398	1 559	-0.30	0.71	1 376	1 528	-0.06	0.72
Malaysia	843	996	7.91	1.05	842	996	7.90	1.05
Pakistan	2 559	3 794	36.15	2.62	2 555	3 784	36.20	2.63
Philippines	218	300	20.06	1.58	218	300	20.37	1.58
Saudi Arabia	582	741	126.28	1.38	582	741	126.28	1.38
Thailand	2 900	3 413	5.27	1.50	2 865	3 394	5.50	1.51
Turkey	2 214	2 477	6.78	1.58	2 160	2 433	7.18	1.61
Viet Nam	1 897	2 482	11.35	2.18	1 855	2 452	14.52	2.21
OCEANIA	41	42	-1.08	2.66	40	40	-1.06	2.77
Australia	40	41	-1.09	2.74	40	40	-1.06	2.77
New Zealand	1	1	0.00	0.00	0	0	0.00	0.00
DEVELOPED COUNTRIES	**94 714**	**100 470**	**3.65**	**0.44**	**85 887**	**91 094**	**3.58**	**0.43**
DEVELOPING COUNTRIES	**253 586**	**305 587**	**4.12**	**1.64**	**227 082**	**277 748**	**4.36**	**1.73**
LEAST DEVELOPED COUNTRIES (LDC)	2 139	2 849	14.29	1.72	1 710	2 325	19.83	1.66
OECD[3]	**96 136**	**102 174**	**3.35**	**0.49**	**87 709**	**93 299**	**3.30**	**0.49**
BRICS	**171 349**	**205 482**	**4.04**	**1.73**	**147 955**	**181 263**	**4.24**	**1.89**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.19.1. Other oilseed projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**153 896**	**174 906**	**2.85**	**1.24**	**21 144**	**23 692**	**3.60**	**1.35**	**20 663**	**23 692**	**3.39**	**1.35**
NORTH AMERICA	24 655	27 322	4.74	1.63	955	957	0.13	1.96	10 519	12 289	3.31	2.09
Canada	20 166	22 535	5.04	1.89	259	241	-1.25	0.02	9 884	11 742	3.47	2.23
United States	4 489	4 787	3.80	0.45	697	716	1.05	2.71	635	547	1.45	-0.67
LATIN AMERICA	6 295	9 160	2.29	3.49	1 760	2 233	0.61	2.58	1 044	1 702	8.38	5.27
Argentina	4 558	7 009	1.95	4.04	1	1	41.68	0.00	708	1 299	7.95	6.56
Brazil	591	815	7.28	3.09	5	5	-11.98	0.00	211	260	22.08	2.00
Chile	200	237	9.08	1.56	38	29	7.36	-1.82	9	10	14.24	1.57
Colombia	2	3	0.00	2.58	7	7	0.00	-0.10	0	0	..	..
Mexico	105	120	1.10	1.28	1 682	2 165	0.58	2.72	3	3	10.43	0.00
Paraguay	215	254	-1.33	1.52	0	0	-16.50	..	27	36	-3.04	3.32
Peru	6	8	0.00	2.41	1	1	0.00	6.32	0	0	..	..
EUROPE	63 599	70 239	4.01	0.94	6 297	5 975	3.66	-0.55	5 092	5 770	4.35	1.02
European Union[1]	27 807	26 587	1.01	-0.02	5 758	5 571	3.86	-0.61	894	723	0.14	0.17
United Kingdom	2 046	2 000	-2.81	0.21	312	166	-0.04	1.09	288	377	-7.45	0.32
Russia	13 628	16 054	7.82	1.32	148	152	3.17	-0.14	350	253	14.73	-1.65
Ukraine	17 637	22 524	8.02	1.83	20	26	-0.18	-0.09	2 697	3 381	6.38	1.04
AFRICA	9 162	10 702	1.20	1.43	464	567	5.21	2.24	225	156	3.84	-3.72
Egypt	117	126	-0.41	0.57	99	113	5.18	1.54	22	19	7.15	-1.52
Ethiopia	99	110	2.88	0.65	0	1	..	..	0	0	..	..
Nigeria	2 130	2 524	0.17	1.67	0	0	..	..	33	0	-10.09	-53.30
South Africa	898	1 038	3.65	1.19	55	101	5.27	5.83	0	0	-73.62	..
ASIA	47 334	54 267	1.33	1.21	11 641	13 939	4.45	2.02	2 028	1 561	8.10	-1.37
China[2]	27 892	30 967	1.10	0.95	4 642	6 289	10.74	3.10	634	514	2.80	-0.11
India	12 220	14 917	1.34	1.70	253	302	6.68	-0.46	579	207	5.57	-8.39
Indonesia	623	736	-2.46	1.60	218	240	4.28	0.37	2	1	-3.20	-0.03
Iran	395	459	5.79	1.37	193	221	35.46	1.81	1	1	0.00	-0.16
Japan	20	21	-1.06	0.66	2 456	2 407	0.04	-0.10	0	0	..	..
Kazakhstan	1 141	1 333	11.22	1.39	7	7	1.78	-0.30	515	596	34.29	1.59
Korea	13	16	1.94	1.23	29	27	-2.21	-0.66	0	0	..	..
Malaysia	5	6	0.00	1.58	44	48	2.83	0.91	3	3	3.71	-0.91
Pakistan	750	890	-2.79	1.70	1 030	1 261	2.28	4.17	0	0	-66.28	..
Philippines	20	25	0.46	2.09	62	67	1.09	0.95	0	0	..	..
Saudi Arabia	3	3	0.00	1.37	4	4	0.00	0.14	0	0	..	..
Thailand	90	120	-0.09	2.74	51	46	-0.55	-3.25	3	4	1.57	2.07
Turkey	1 893	2 262	6.29	1.54	833	787	-1.98	-0.44	62	32	4.23	0.30
Viet Nam	328	368	2.48	1.06	184	244	262.51	2.20	35	27	11.99	-2.16
OCEANIA	2 850	3 218	-2.17	-0.84	27	21	-1.53	-0.59	1 754	2 215	-3.96	-1.21
Australia	2 838	3 204	-2.18	-0.84	23	17	1.53	-0.70	1 754	2 214	-3.96	-1.21
New Zealand	10	10	0.00	-0.06	4	4	-9.74	0.13	0	0	..	..
DEVELOPED COUNTRIES	**93 291**	**103 314**	**4.02**	**1.06**	**10 137**	**9 885**	**2.56**	**-0.07**	**17 909**	**20 893**	**3.03**	**1.37**
DEVELOPING COUNTRIES	**60 605**	**71 593**	**1.26**	**1.50**	**11 008**	**13 807**	**4.69**	**2.51**	**2 754**	**2 799**	**6.09**	**1.23**
LEAST DEVELOPED COUNTRIES (LDC)	6 352	7 284	0.85	1.22	246	369	-0.17	5.70	148	129	12.53	-2.53
OECD[3]	**59 711**	**61 915**	**2.24**	**0.70**	**12 260**	**12 309**	**1.75**	**0.25**	**13 546**	**15 662**	**1.50**	**1.40**
BRICS	**55 229**	**63 790**	**2.56**	**1.24**	**5 102**	**6 848**	**9.88**	**2.86**	**1 774**	**1 234**	**6.54**	**-2.02**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.19.2. Other oilseed projections: Consumption, domestic crush

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		DOMESTIC CRUSH (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**153 834**	**174 883**	**2.83**	**1.23**	**133 030**	**151 730**	**3.13**	**1.28**
NORTH AMERICA	14 313	15 996	4.40	1.13	12 122	13 670	4.69	1.22
Canada	9 822	11 040	4.99	1.24	9 394	10 548	4.87	1.28
United States	4 491	4 956	3.27	0.88	2 728	3 122	4.18	1.02
LATIN AMERICA	7 078	9 690	1.56	3.00	6 549	9 028	1.45	3.06
Argentina	3 916	5 711	1.72	3.53	3 781	5 526	1.86	3.56
Brazil	388	559	3.16	3.61	310	442	1.92	3.60
Chile	229	256	8.57	1.11	210	230	8.54	0.91
Colombia	9	10	0.00	0.60	8	9	0.00	0.82
Mexico	1 784	2 283	0.60	2.65	1 615	2 105	0.22	2.82
Paraguay	187	218	-1.47	1.25	154	177	-1.66	1.05
Peru	7	9	0.00	2.81	3	3	0.00	0.65
EUROPE	64 777	70 435	3.93	0.81	60 416	65 637	4.14	0.82
European Union[1]	32 795	31 434	1.53	-0.12	30 292	28 917	1.50	-0.12
United Kingdom	2 069	1 789	-1.19	0.27	1 934	1 650	-1.36	0.40
Russia	13 293	15 955	7.63	1.35	12 656	15 066	8.40	1.26
Ukraine	14 960	19 163	8.31	1.97	14 103	18 164	8.80	2.06
AFRICA	9 427	11 112	1.30	1.56	5 713	6 184	1.60	0.64
Egypt	192	219	1.61	1.31	142	163	3.85	1.41
Ethiopia	99	111	2.88	0.72	62	63	5.45	-0.43
Nigeria	2 097	2 524	0.45	1.73	734	555	0.45	-3.09
South Africa	985	1 138	3.32	1.53	889	1 035	3.41	1.59
ASIA	57 131	66 626	1.74	1.44	47 258	56 251	2.03	1.68
China[2]	31 981	36 741	2.01	1.30	25 356	30 091	2.33	1.69
India	12 009	14 998	1.32	1.89	10 572	13 375	1.53	1.98
Indonesia	841	975	-0.90	1.28	261	333	2.92	2.25
Iran	585	679	10.63	1.52	544	623	11.07	1.39
Japan	2 464	2 428	0.04	-0.10	2 449	2 410	0.14	-0.10
Kazakhstan	623	743	4.45	1.27	484	577	4.41	1.11
Korea	43	43	-1.46	0.00	38	38	-1.47	-0.01
Malaysia	46	51	2.48	1.09	45	49	2.70	0.97
Pakistan	1 787	2 151	-0.11	3.08	1 655	1 997	0.05	3.24
Philippines	81	92	1.08	1.24	69	78	1.11	1.34
Saudi Arabia	7	7	0.00	0.68	5	5	0.00	0.71
Thailand	138	161	-0.18	0.66	81	116	-0.31	1.76
Turkey	2 667	3 017	3.32	1.01	2 459	2 765	3.04	0.96
Viet Nam	482	584	6.68	1.71	363	443	9.05	1.67
OCEANIA	1 107	1 024	3.08	0.03	971	961	2.76	0.03
Australia	1 090	1 007	3.23	0.03	960	949	2.80	0.03
New Zealand	14	14	-4.40	0.00	11	11	0.00	0.00
DEVELOPED COUNTRIES	**84 705**	**92 301**	**3.89**	**0.85**	**77 737**	**84 790**	**4.08**	**0.87**
DEVELOPING COUNTRIES	**69 129**	**82 582**	**1.64**	**1.68**	**55 293**	**66 940**	**1.91**	**1.83**
LEAST DEVELOPED COUNTRIES (LDC)	6 447	7 523	0.56	1.48	4 472	5 068	0.65	1.15
OECD[3]	**57 751**	**58 566**	**2.12**	**0.39**	**52 344**	**53 020**	**2.07**	**0.40**
BRICS	**58 657**	**69 390**	**2.93**	**1.46**	**49 783**	**60 008**	**3.42**	**1.65**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.20.1. Protein meal projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**342 665**	**402 941**	**3.45**	**1.40**	**89 890**	**98 161**	**2.45**	**0.77**	**90 422**	**98 161**	**1.83**	**0.77**
NORTH AMERICA	56 155	59 958	3.06	0.58	4 753	4 149	2.98	-0.95	17 322	16 889	4.49	-0.14
Canada	6 831	8 269	4.68	2.14	968	510	-1.51	-5.63	5 051	5 800	6.32	1.40
United States	49 325	51 690	2.85	0.35	3 785	3 640	4.50	-0.06	12 271	11 089	3.78	-0.86
LATIN AMERICA	82 242	98 281	2.46	1.44	9 443	10 652	2.87	1.34	49 632	58 317	1.48	1.42
Argentina	35 243	40 672	2.23	1.13	0	0	..	..	31 268	36 228	1.88	1.15
Brazil	33 992	42 046	1.80	1.76	5	5	-15.67	0.00	13 998	17 416	-0.49	2.20
Chile	295	435	5.17	1.28	1 071	983	0.97	0.27	1	1	-20.01	-0.03
Colombia	912	1 070	7.26	1.18	1 520	1 872	11.19	2.06	97	76	5.98	-2.02
Mexico	5 129	6 098	3.94	1.32	1 969	2 184	3.45	1.14	22	22	1.91	0.00
Paraguay	3 221	3 948	8.13	1.53	2	2	0.55	0.07	2 566	3 060	11.75	1.31
Peru	337	369	14.91	0.89	1 470	2 174	8.22	3.81	5	5	0.00	-0.88
EUROPE	46 948	50 699	3.90	0.64	28 919	27 612	-0.15	-0.53	9 367	10 693	4.43	1.11
European Union[1]	28 693	28 543	2.28	0.14	23 773	22 127	-0.16	-0.86	1 859	860	-0.77	-5.45
United Kingdom	1 102	1 297	-1.42	1.38	3 192	3 241	0.96	0.65	227	272	2.74	3.17
Russia	8 377	9 758	7.48	0.87	129	88	-17.85	-0.09	1 799	2 548	4.83	1.93
Ukraine	7 362	9 349	8.90	1.85	37	29	-9.15	-0.21	5 066	6 558	7.57	2.06
AFRICA	9 881	13 672	5.88	2.26	4 749	5 223	1.23	2.02	678	603	2.56	-1.73
Egypt	2 895	4 685	8.32	3.06	504	4	-7.11	-29.10	11	8	21.54	3.57
Ethiopia	103	129	8.40	1.57	0	0	..	..	0	0	..	..
Nigeria	960	993	3.89	-0.01	467	648	32.10	2.75	183	146	5.81	-2.68
South Africa	1 350	1 773	9.37	1.99	680	844	-7.73	2.69	28	31	-11.88	-1.00
ASIA	146 371	178 570	3.90	1.80	38 745	46 995	4.46	1.49	13 312	11 464	-1.15	-1.03
China[2]	86 441	106 698	4.61	2.00	3 180	3 470	10.74	-1.51	1 005	620	0.43	0.35
India	19 514	23 398	-0.21	1.73	413	687	24.10	3.66	2 716	1 448	-10.25	-3.53
Indonesia	8 001	10 292	6.07	1.74	4 695	5 127	4.50	0.68	5 380	5 367	6.59	-0.68
Iran	2 222	2 481	17.44	1.03	2 194	3 070	-0.71	-0.12	43	9	-23.54	0.04
Japan	3 609	3 442	1.57	-0.46	1 813	1 734	-2.79	-0.60	0	1	15.59	0.00
Kazakhstan	414	477	2.18	0.81	5	5	-0.10	0.03	123	141	-2.04	0.65
Korea	1 180	1 300	0.07	0.66	3 379	3 990	-0.07	1.36	50	50	-5.58	0.00
Malaysia	3 459	3 794	1.80	0.73	1 599	1 673	4.45	0.49	2 578	2 510	1.10	-0.48
Pakistan	4 501	6 012	5.56	2.35	346	195	-7.10	8.10	68	78	-10.98	-2.08
Philippines	1 073	1 378	2.52	1.92	2 939	3 595	6.05	1.99	389	301	-2.94	-1.96
Saudi Arabia	462	588	75.35	1.37	1 704	2 087	16.15	1.65	55	46	79.25	-1.63
Thailand	2 763	3 305	6.60	1.59	3 610	4 328	1.89	1.83	12	12	7.05	-0.19
Turkey	3 818	4 378	4.52	1.37	2 138	2 791	5.78	2.81	94	73	-3.07	-1.34
Viet Nam	1 691	2 213	12.52	2.14	6 064	8 910	8.58	3.90	84	97	12.85	-3.33
OCEANIA	1 068	1 762	2.13	4.78	3 282	3 530	7.03	1.20	110	194	-3.16	1.62
Australia	936	1 608	2.40	5.16	976	1 027	6.86	0.88	57	125	-6.83	1.30
New Zealand	8	8	0.28	0.00	2 293	2 493	7.15	1.35	0	0	..	..
DEVELOPED COUNTRIES	**110 739**	**119 355**	**3.34**	**0.65**	**40 258**	**39 010**	**0.41**	**-0.28**	**26 909**	**27 895**	**4.35**	**0.33**
DEVELOPING COUNTRIES	**231 926**	**283 587**	**3.50**	**1.73**	**49 632**	**59 151**	**4.40**	**1.53**	**63 513**	**70 266**	**0.92**	**0.95**
LEAST DEVELOPED COUNTRIES (LDC)	4 706	6 049	5.15	1.87	889	1 281	8.36	4.44	350	340	4.10	-1.23
OECD[3]	**102 363**	**108 771**	**2.82**	**0.57**	**48 317**	**48 538**	**1.18**	**0.07**	**19 807**	**18 474**	**3.63**	**-0.43**
BRICS	**149 675**	**183 673**	**3.37**	**1.84**	**4 408**	**5 093**	**3.79**	**-0.30**	**19 546**	**22 064**	**-1.96**	**1.62**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.20.2. Protein meal projections: Consumption

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29
WORLD	**343 104**	**402 871**	**3.63**	**1.39**
NORTH AMERICA	**43 573**	**47 216**	**2.53**	**0.69**
Canada	2 708	2 976	-0.20	1.42
United States	40 865	44 240	2.73	0.64
LATIN AMERICA	**42 408**	**50 604**	**3.49**	**1.43**
Argentina	3 979	4 445	1.94	0.96
Brazil	20 249	24 635	3.55	1.46
Chile	1 356	1 417	1.91	0.55
Colombia	2 344	2 865	9.67	1.84
Mexico	7 076	8 259	3.84	1.27
Paraguay	690	884	2.14	2.18
Peru	1 802	2 536	9.15	3.33
EUROPE	**66 445**	**67 611**	**1.91**	**0.08**
European Union[1]	50 606	49 809	1.18	-0.19
United Kingdom	4 067	4 266	0.19	0.72
Russia	6 717	7 297	7.07	0.51
Ukraine	2 263	2 814	11.68	1.30
AFRICA	**13 941**	**18 285**	**4.36**	**2.35**
Egypt	3 371	4 678	5.20	2.83
Ethiopia	103	129	8.40	1.57
Nigeria	1 244	1 494	8.78	1.43
South Africa	1 986	2 585	1.22	2.24
ASIA	**172 496**	**214 057**	**4.60**	**1.90**
China[2]	89 084	109 554	5.03	1.87
India	17 164	22 616	2.04	2.23
Indonesia	7 375	10 050	5.02	2.66
Iran	4 386	5 541	6.78	0.35
Japan	5 418	5 176	-0.19	-0.51
Kazakhstan	297	340	5.02	0.87
Korea	4 496	5 240	0.06	1.19
Malaysia	2 477	2 955	4.33	1.73
Pakistan	4 825	6 127	4.47	2.55
Philippines	3 626	4 668	6.54	2.27
Saudi Arabia	2 165	2 628	18.93	1.65
Thailand	6 364	7 620	3.84	1.73
Turkey	5 914	7 093	5.45	1.95
Viet Nam	7 706	11 018	9.22	3.60
OCEANIA	**4 240**	**5 098**	**6.06**	**2.29**
Australia	1 856	2 510	4.86	3.39
New Zealand	2 301	2 500	7.34	1.35
DEVELOPED COUNTRIES	**123 999**	**130 460**	**2.12**	**0.42**
DEVELOPING COUNTRIES	**219 105**	**272 412**	**4.57**	**1.89**
LEAST DEVELOPED COUNTRIES (LDC)	**5 250**	**6 989**	**5.77**	**2.48**
OECD[3]	**130 895**	**138 827**	**2.09**	**0.53**
BRICS	**135 199**	**166 687**	**4.41**	**1.80**

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.21.1. Vegetable oil projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**209 498**	**246 688**	**3.91**	**1.41**	**84 555**	**97 915**	**3.68**	**1.27**	**84 765**	**97 915**	**3.45**	**1.27**
NORTH AMERICA	17 876	18 818	3.62	0.64	4 922	5 115	3.71	0.22	4 654	4 823	2.11	1.91
Canada	4 554	4 953	5.10	1.29	287	332	-1.09	-0.03	3 458	3 712	4.44	1.77
United States	13 322	13 866	3.15	0.41	4 635	4 783	4.08	0.24	1 196	1 110	-2.79	2.41
LATIN AMERICA	27 446	33 536	3.32	1.77	4 686	4 913	2.05	0.30	11 341	13 992	3.80	1.75
Argentina	9 388	11 324	2.23	1.58	17	17	6.01	0.00	6 037	7 212	2.63	1.11
Brazil	9 299	11 420	2.43	1.90	502	543	2.01	0.94	1 484	2 610	-2.45	4.91
Chile	121	157	6.38	1.14	469	552	5.71	1.59	1	1	-11.18	-0.23
Colombia	2 031	2 801	7.89	2.67	708	573	7.67	-1.85	863	1 049	19.31	1.88
Mexico	2 012	2 450	3.10	1.64	977	1 058	3.09	0.51	54	54	5.45	0.00
Paraguay	789	962	7.41	1.50	13	11	2.02	-1.55	682	837	13.54	1.57
Peru	286	348	8.62	1.71	621	819	6.73	2.60	1	0	0.00	-0.21
EUROPE	29 966	32 683	4.33	0.85	14 137	11 385	2.91	-1.68	11 915	14 130	8.35	1.21
European Union[1]	15 584	15 362	1.97	0.01	10 647	8 021	2.89	-2.14	2 334	2 308	3.09	-1.12
United Kingdom	992	828	-1.93	2.00	1 187	1 172	2.23	-0.64	195	168	-6.94	1.35
Russia	6 063	7 110	8.77	1.20	1 113	1 098	3.77	0.05	2 858	3 466	14.31	1.63
Ukraine	6 594	8 456	8.83	2.00	283	235	-1.43	-1.80	6 147	7 753	10.15	1.83
AFRICA	8 246	10 096	3.30	1.57	11 446	14 990	4.31	2.62	1 357	1 087	-0.92	-2.62
Egypt	733	1 142	7.03	2.92	1 929	2 068	1.68	0.85	134	102	-13.55	-0.85
Ethiopia	57	69	7.64	1.11	517	788	11.95	4.26	0	0	..	..
Nigeria	1 701	1 943	2.00	0.87	1 387	2 250	4.26	4.34	65	84	-6.27	-3.22
South Africa	556	691	6.27	1.78	886	966	1.22	0.78	17	19	-21.56	-0.48
ASIA	124 614	149 848	4.05	1.54	49 013	61 150	3.93	1.80	54 573	62 821	2.81	1.22
China[2]	26 709	32 693	3.98	1.94	10 145	10 952	0.59	0.49	201	183	1.25	0.00
India	9 198	11 102	0.09	1.73	15 393	22 447	6.72	3.20	67	44	-5.24	-0.51
Indonesia	49 842	62 236	7.05	1.68	122	116	5.96	-0.01	31 826	39 486	5.60	1.81
Iran	665	745	15.13	1.11	1 362	1 441	-2.38	-0.19	26	30	-25.45	0.15
Japan	1 544	1 493	0.82	-0.30	902	1 020	2.36	1.02	2	2	-1.72	0.00
Kazakhstan	287	329	2.87	0.91	153	172	7.56	0.34	94	99	35.31	-0.34
Korea	305	334	0.03	0.62	1 157	1 207	4.70	0.35	3	3	-17.66	0.00
Malaysia	22 553	24 342	0.80	0.65	1 706	1 779	-3.51	-0.39	18 895	19 660	-0.36	0.40
Pakistan	1 935	2 470	1.70	2.31	3 406	4 317	5.68	2.28	77	57	-7.11	-2.09
Philippines	1 790	2 272	1.17	1.97	1 391	1 539	13.39	0.85	965	869	0.96	-0.84
Saudi Arabia	107	136	52.61	1.37	858	1 140	11.47	2.57	63	43	39.89	-2.51
Thailand	3 992	4 978	8.43	1.83	306	303	3.55	-2.55	576	661	1.18	2.62
Turkey	1 875	2 154	3.53	1.23	1 393	1 457	2.52	0.24	423	444	-0.71	-0.24
Viet Nam	671	853	8.50	1.94	1 062	1 230	5.39	1.17	156	143	14.78	-1.16
OCEANIA	1 350	1 706	2.23	2.18	351	362	4.49	0.33	925	1 063	2.58	0.98
Australia	502	715	2.47	3.46	221	219	5.87	-0.05	177	191	4.61	-0.40
New Zealand	5	4	0.86	0.00	101	118	3.41	1.50	0	0	..	..
DEVELOPED COUNTRIES	**51 551**	**55 609**	**3.85**	**0.78**	**21 794**	**19 570**	**3.12**	**-0.83**	**16 894**	**19 294**	**6.03**	**1.35**
DEVELOPING COUNTRIES	**157 947**	**191 079**	**3.93**	**1.60**	**62 761**	**78 345**	**3.88**	**1.87**	**67 872**	**78 621**	**2.89**	**1.25**
LEAST DEVELOPED COUNTRIES (LDC)	3 842	4 677	2.23	1.62	7 548	10 274	7.10	2.82	479	355	5.25	-3.04
OECD[3]	**43 093**	**45 402**	**2.87**	**0.64**	**23 411**	**21 260**	**3.39**	**-0.76**	**8 854**	**9 192**	**2.91**	**0.86**
BRICS	**51 823**	**63 015**	**3.38**	**1.81**	**28 039**	**36 006**	**3.83**	**2.10**	**4 628**	**6 322**	**4.31**	**2.77**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.21.2. Vegetable oil projections: Consumption, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**209 762**	**246 424**	**4.25**	**1.40**	**18.3**	**19.8**	**2.32**	**0.85**
NORTH AMERICA	18 315	19 111	3.93	0.26	39.2	39.0	1.20	0.60
Canada	1 464	1 573	5.94	0.40	36.3	35.3	3.81	-0.36
United States	16 852	17 537	3.77	0.25	39.5	39.4	0.96	0.71
LATIN AMERICA	20 798	24 452	2.85	1.47	19.2	20.2	0.57	0.48
Argentina	3 368	4 128	1.66	2.41	19.2	21.7	0.22	1.16
Brazil	8 306	9 353	3.52	1.15	24.3	24.4	0.17	0.36
Chile	587	709	6.07	1.49	11.5	12.5	3.16	0.58
Colombia	1 882	2 323	4.72	1.69	21.0	24.8	2.99	1.44
Mexico	2 936	3 454	3.06	1.31	23.3	24.7	1.79	0.40
Paraguay	122	136	-5.28	0.80	16.5	16.3	-6.02	-0.27
Peru	905	1 165	7.31	2.33	10.6	12.7	5.22	1.75
EUROPE	32 285	29 942	2.65	-0.37	25.5	25.1	3.31	0.51
European Union[1]	23 981	21 081	2.40	-0.79	25.6	23.7	3.35	0.32
United Kingdom	1 984	1 832	1.39	0.28	29.6	26.1	0.70	-0.09
Russia	4 340	4 742	5.73	0.62	29.8	33.0	5.52	0.80
Ukraine	715	935	-2.28	2.30	12.2	17.7	-2.82	3.36
AFRICA	18 351	23 985	4.42	2.47	9.5	10.0	1.65	0.57
Egypt	2 550	3 107	5.39	1.64	8.4	9.1	5.31	0.69
Ethiopia	575	856	11.48	3.97	4.9	5.9	8.65	1.95
Nigeria	3 013	4 107	3.28	2.75	10.0	10.4	0.49	0.32
South Africa	1 439	1 639	4.14	1.20	13.8	14.8	2.29	0.83
ASIA	119 249	147 931	5.02	1.77	17.7	20.7	3.00	1.34
China[2]	37 532	43 461	3.81	1.45	26.3	29.8	3.27	1.29
India	24 809	33 474	4.09	2.69	11.1	14.3	1.04	2.32
Indonesia	16 884	22 713	10.37	1.54	24.2	34.3	10.05	1.65
Iran	2 038	2 156	3.48	0.23	11.6	11.3	0.78	-0.42
Japan	2 430	2 511	1.28	0.21	19.1	20.7	1.42	0.67
Kazakhstan	349	402	1.70	1.01	18.1	19.0	0.19	0.20
Korea	1 460	1 539	3.78	0.41	16.2	18.6	0.35	0.98
Malaysia	5 426	6 428	4.73	1.10	27.2	30.9	4.89	0.27
Pakistan	5 264	6 723	4.46	2.33	20.4	22.4	2.54	0.99
Philippines	2 253	2 939	7.79	2.32	6.1	8.4	12.30	2.03
Saudi Arabia	902	1 231	12.35	2.65	21.4	24.9	9.34	1.23
Thailand	3 790	4 616	9.68	1.37	13.5	18.3	8.18	2.54
Turkey	2 881	3 166	4.16	0.99	25.9	26.5	1.98	0.47
Viet Nam	1 574	1 939	6.12	1.70	2.5	3.4	3.06	2.88
OCEANIA	763	1 005	2.69	2.81	17.4	20.5	1.59	1.78
Australia	533	743	2.92	3.43	21.4	26.6	1.46	2.39
New Zealand	105	123	3.28	1.44	22.2	23.9	2.25	0.73
DEVELOPED COUNTRIES	**56 708**	**55 886**	**3.00**	**0.01**	**27.1**	**27.2**	**2.23**	**0.61**
DEVELOPING COUNTRIES	**153 053**	**190 538**	**4.75**	**1.85**	**16.2**	**18.3**	**2.48**	**1.01**
LEAST DEVELOPED COUNTRIES (LDC)	10 948	14 588	5.38	2.60	8.6	9.3	2.40	0.83
OECD[3]	**57 920**	**57 473**	**3.09**	**0.07**	**27.7**	**27.7**	**2.01**	**0.57**
BRICS	**76 427**	**92 669**	**3.98**	**1.80**	**19.7**	**22.5**	**2.44**	**1.32**

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.22. Main policy assumptions for oilseed markets

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Export tax												
Soybean	%	29.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Other oilseeds	%	8.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Soybean meal	%	28.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Soybean oil	%	28.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
AUSTRALIA												
Tariffs												
Soybean oil	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Rapeseed oil	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
CANADA												
Tariffs												
Rapeseed oil	%	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
EUROPEAN UNION[1,2]												
Voluntary coupled support												
Soybean	mln EUR	34	37	39	40	41	42	44	46	47	49	51
Tariffs												
Soybean oil	%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Rapeseed oil	%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
JAPAN												
New output payments												
Soybean	JPY/kg	150.7	150.7	150.7	150.7	150.7	150.7	150.7	150.7	150.7	150.7	150.7
Tariffs												
Soybean oil	JPY/kg	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Rapeseed oil	JPY/kg	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
KOREA												
Soybean tariff-quota	kt	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032
In-quota tariff	%	5	5	5	5	5	5	5	5	5	5	5
Out-of-quota tariff	%	487	487	487	487	487	487	487	487	487	487	487
Soybean (for food) mark up	'000 KRW/t	131	131	131	131	131	131	131	131	131	131	131
MEXICO												
Tariffs												
Soybean	%	33	33	33	33	33	33	33	33	33	33	33
Soybean meal	%	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Soybean oil	%	45	45	45	45	45	45	45	45	45	45	45
UNITED STATES												
ARC participation rate												
Soybean	%	96.9	96.9	96.9	96.9	96.9	96.9	96.9	96.9	96.9	96.9	96.9
Soybean loan rate	USD/t	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7
Tariffs												
Rapeseed	%	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Soybean meal	%	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Rapeseed meal	%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Soybean oil	%	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Rapeseed oil	%	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
CHINA												
Tariffs												
Soybean	%	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Soybean meal	%	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Soybean oil in-quota tariff	%	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Vegetable oil tariff-quota	kt	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1
INDIA												
Soybean tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Rapeseed tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Soybean meal tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Soybean oil tariff	%	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
INDONESIA												
Protein meal tariff	%	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PAKISTAN												
Protein meal tariff	%	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
VIET NAM												
Protein meal tariff	%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
2. Refers to all current European Union member States (excludes the United Kingdom)

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.23.1. Sugar projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**175 645**	**202 813**	**0.78**	**1.45**	**56 570**	**67 075**	**0.92**	**1.47**	**59 947**	**70 075**	**1.12**	**1.40**
NORTH AMERICA	7 475	7 684	0.75	0.46	3 861	3 780	-2.97	-0.32	75	60	-18.24	0.00
Canada	109	104	0.49	0.34	1 181	1 056	-0.66	-0.54	38	30	-4.16	0.00
United States	7 366	7 580	0.75	0.46	2 681	2 723	-3.89	-0.24	37	30	-24.04	0.00
LATIN AMERICA	51 207	61 329	-1.00	0.96	1 994	1 712	-2.62	-1.13	28 274	36 959	-1.25	1.30
Argentina	1 842	2 203	0.39	1.44	0	0	-66.93	..	281	694	9.38	5.78
Brazil	30 133	37 139	-2.26	0.74	1	0	4.70	..	20 672	26 940	-2.35	1.08
Chile	232	293	-3.21	2.59	510	490	0.43	-0.70	0	0	..	..
Colombia	2 359	2 589	1.14	1.25	108	85	-7.83	-2.38	743	914	-0.29	2.44
Mexico	6 079	6 185	1.18	0.50	64	10	-13.25	0.00	1 638	1 743	0.69	0.21
Paraguay	145	202	0.58	3.55	85	65	51.41	-2.46	112	116	6.74	2.53
Peru	1 234	1 608	1.83	1.67	206	228	0.19	3.54	99	98	5.73	-3.43
EUROPE	28 588	28 881	1.89	0.83	3 405	2 524	-9.42	-3.99	4 691	5 213	8.07	4.52
European Union[1]	17 545	17 349	0.74	0.55	1 631	1 303	-8.48	-5.15	2 537	2 695	4.65	4.71
United Kingdom	1 111	1 181	-0.09	1.49	943	774	-4.39	-0.76	379	372	4.16	3.29
Russia	6 693	6 538	7.49	0.54	247	66	-21.65	-11.87	865	803	268.59	0.13
Ukraine	1 798	1 961	-1.39	2.53	0	0	-69.55	..	422	642	61.04	13.07
AFRICA	11 294	15 831	2.22	2.81	14 284	17 565	3.11	2.20	4 090	3 184	0.17	-2.30
Egypt	2 448	4 100	4.08	3.90	1 193	690	-1.81	-2.56	132	228	-8.85	2.46
Ethiopia	405	689	5.05	3.60	248	363	17.83	3.36	37	26	287.99	-10.08
Nigeria	17	0	-2.55	..	1 193	1 612	0.92	2.78	0	0	-34.90	..
South Africa	2 151	2 683	0.98	2.00	353	188	-4.53	-2.90	737	999	1.39	2.98
ASIA	72 342	84 291	1.46	1.95	32 640	41 090	2.85	1.93	19 026	20 830	4.10	1.81
China[2]	10 756	12 198	-1.44	1.12	4 800	6 257	4.33	1.03	106	68	7.91	0.00
India	30 813	35 252	1.84	1.90	1 469	1 536	14.94	0.52	4 082	4 230	6.26	-0.52
Indonesia	2 355	2 799	-1.25	1.14	4 848	7 495	6.53	4.28	0	0	..	..
Iran	1 752	2 315	7.68	1.66	620	411	-9.97	-2.64	24	0	-66.84	..
Japan	746	750	1.42	0.00	1 313	1 256	-0.42	-0.71	4	5	16.40	0.00
Kazakhstan	45	0	17.56	..	458	531	1.30	0.57	27	4	16.26	-0.57
Korea	0	0	..	..	1 907	2 086	1.15	0.81	311	336	-0.96	0.36
Malaysia	0	0	-81.13	..	2 024	2 408	1.22	1.52	116	83	-11.44	-1.50
Pakistan	5 784	7 370	3.56	2.67	9	8	-22.19	-0.98	771	650	12.73	13.10
Philippines	2 126	2 550	-1.28	1.60	73	119	114.43	-1.63	223	342	-5.62	2.37
Saudi Arabia	0	0	..	..	1 574	1 827	2.49	1.24	321	282	6.55	-1.23
Thailand	12 972	15 759	2.58	2.89	0	0	-45.79	..	9 737	12 656	4.88	3.43
Turkey	2 435	2 653	1.06	1.34	159	1	65.83	-45.60	20	52	-13.38	9.79
Viet Nam	1 359	1 267	0.28	1.75	356	823	14.28	2.80	47	53	76.81	-2.08
OCEANIA	4 740	4 798	2.10	0.49	386	404	-1.09	-0.33	3 790	3 829	4.67	0.41
Australia	4 510	4 436	2.14	0.29	86	120	-8.51	0.00	3 612	3 583	4.95	0.31
New Zealand	0	0	..	..	243	238	0.21	-0.08	20	20	-1.66	0.00
DEVELOPED COUNTRIES	**43 717**	**44 732**	**1.71**	**0.78**	**11 817**	**10 975**	**-4.54**	**-1.03**	**9 379**	**10 066**	**5.25**	**2.54**
DEVELOPING COUNTRIES	**131 928**	**158 082**	**0.50**	**1.65**	**44 753**	**56 100**	**2.95**	**2.03**	**50 568**	**60 009**	**0.52**	**1.22**
LEAST DEVELOPED COUNTRIES (LDC)	3 994	5 272	2.59	2.71	9 868	14 513	5.68	4.01	2 291	579	0.68	-10.42
OECD[3]	**42 731**	**43 407**	**0.93**	**0.61**	**11 568**	**11 006**	**-2.97**	**-1.01**	**9 347**	**9 789**	**2.62**	**1.69**
BRICS	**80 547**	**93 810**	**0.02**	**1.23**	**6 870**	**8 047**	**0.82**	**0.61**	**26 461**	**33 041**	**-0.69**	**0.85**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated. Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.23.2. Sugar projections: Consumption, food

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**171 123**	**198 589**	**1.26**	**1.42**	**22.5**	**23.5**	**0.10**	**0.48**
NORTH AMERICA	11 271	11 399	-0.13	0.20	31.0	29.4	-0.76	-0.38
Canada	1 223	1 130	0.48	-0.47	33.0	27.9	-0.53	-1.26
United States	10 048	10 268	-0.20	0.27	30.7	29.5	-0.79	-0.28
LATIN AMERICA	25 357	25 935	-0.70	0.26	39.4	36.9	-1.75	-0.52
Argentina	1 535	1 509	-0.89	-0.08	34.6	31.0	-1.88	-0.90
Brazil	10 397	10 095	-1.99	-0.09	49.6	45.3	-2.81	-0.62
Chile	750	783	0.02	0.42	41.2	40.1	-0.82	-0.20
Colombia	1 672	1 758	0.82	0.48	33.8	33.2	-0.10	-0.10
Mexico	4 310	4 458	0.88	0.11	34.2	31.9	-0.36	-0.79
Paraguay	134	151	1.04	1.06	19.5	19.5	-0.27	-0.01
Peru	1 375	1 719	2.84	2.05	42.2	47.1	1.53	1.03
EUROPE	27 402	26 209	-0.57	-0.31	36.7	35.2	-0.74	-0.24
European Union[1]	16 938	15 967	-0.49	-0.39	38.1	36.1	-0.62	-0.31
United Kingdom	1 692	1 583	-2.17	-0.03	25.2	22.5	-2.84	-0.40
Russia	5 852	5 802	0.68	-0.23	40.2	40.4	0.48	-0.06
Ukraine	1 401	1 326	-3.89	-0.54	31.8	32.0	-3.41	0.01
AFRICA	21 398	29 858	3.52	3.13	16.8	18.1	0.91	0.77
Egypt	3 448	4 496	2.65	2.80	34.7	38.1	0.55	1.25
Ethiopia	627	1 007	6.46	4.23	5.8	7.4	3.80	2.01
Nigeria	1 202	1 612	0.86	2.79	6.1	6.3	-1.76	0.27
South Africa	1 716	1 871	-1.03	0.95	29.9	29.3	-2.34	0.00
ASIA	84 403	103 815	2.27	1.91	18.6	21.1	1.25	1.20
China[2]	16 254	18 416	2.14	1.13	11.4	12.6	1.61	0.94
India	25 919	32 267	2.42	2.02	19.1	21.5	1.22	1.10
Indonesia	7 115	10 223	3.70	3.31	26.7	34.8	2.49	2.45
Iran	2 480	2 722	0.64	0.89	30.3	30.8	-0.53	0.26
Japan	2 095	2 001	-0.80	-0.45	16.5	16.5	-0.66	0.00
Kazakhstan	490	526	1.17	0.59	26.6	26.1	-0.26	-0.20
Korea	1 579	1 743	1.71	0.92	30.9	34.0	1.32	0.94
Malaysia	1 890	2 309	3.40	1.67	59.0	63.3	1.76	0.50
Pakistan	5 330	6 683	2.50	2.03	26.5	27.7	0.45	0.40
Philippines	2 042	2 318	0.85	1.36	19.2	18.7	-0.74	0.00
Saudi Arabia	1 262	1 536	2.87	1.72	37.6	39.3	0.38	0.40
Thailand	2 882	3 070	1.30	0.55	41.7	44.1	0.95	0.51
Turkey	2 391	2 552	1.02	0.52	29.2	29.0	-0.53	0.02
Viet Nam	1 608	2 019	3.40	2.19	16.7	19.1	2.29	1.37
OCEANIA	1 292	1 373	-0.56	0.46	31.9	29.8	-2.04	-0.69
Australia	942	976	-1.35	0.20	37.8	35.0	-2.75	-0.80
New Zealand	220	218	0.30	-0.10	46.4	42.4	-0.71	-0.81
DEVELOPED COUNTRIES	**46 233**	**45 642**	**-0.36**	**-0.03**	**32.5**	**31.3**	**-0.76**	**-0.23**
DEVELOPING COUNTRIES	**124 890**	**152 947**	**1.91**	**1.89**	**20.2**	**21.9**	**0.56**	**0.79**
LEAST DEVELOPED COUNTRIES (LDC)	11 643	18 905	5.55	4.51	13.5	17.1	3.11	2.24
OECD[3]	**44 856**	**44 574**	**-0.14**	**0.02**	**32.5**	**31.1**	**-0.68**	**-0.27**
BRICS	**60 137**	**68 452**	**1.19**	**1.21**	**18.8**	**20.2**	**0.37**	**0.69**

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.24. Main policy assumptions for sugar markets

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Tariff, sugar	ARS/t	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
BRAZIL												
Tariff, raw sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Tariff, white sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
CANADA												
Tariff, raw sugar	CAD/t	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
Tariff, white sugar	CAD/t	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CHINA[1]												
TRQ sugar	kt	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0
In-quota tariff, raw sugar	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
In-quota tariff, white sugar	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Tariff, over-quota	%	82.2	73.3	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
EUROPEAN UNION[2,3]												
Voluntary coupled support												
Sugarbeet[4]	mln EUR	179.1	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3
Tariff, raw sugar	EUR/t	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0
Tariff, white sugar	EUR/t	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0
INDIA												
Tariff, sugar	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
INDONESIA												
Tariff, sugar	%	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
JAPAN												
Minimum stabilisation price, raw sugar	JPY/kg	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2
Tariff, raw sugar	JPY/kg	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8
Tariff, white sugar	JPY/kg	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1
KOREA												
Tariff, raw sugar	%	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Tariff, white sugar	%	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
MEXICO												
Mexico common external tariff, raw sugar	USD/t	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6
Mexico common external tariff, white sugar	USD/t	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4
RUSSIA												
Minimum tariff, raw sugar	USD/t	253.3	240.0	240.0	240.0	203.0	203.0	203.0	203.0	171.0	171.0	171.0
Minimum tariff, white sugar	USD/t	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0
UNITED STATES												
Loan rate, raw sugar	USD/t	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4
Loan rate, white sugar	USD/t	531.1	531.1	531.1	531.1	531.1	531.1	531.1	531.1	531.1	531.1	531.1
TRQ, raw sugar	kt rse	1 461	1 436	1 440	1 443	1 446	1 450	1 453	1 457	1 460	1 463	1 463
TRQ, refined sugar	kt rse	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Raw sugar 2nd tier WTO tariff	USD/t	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6
White sugar 2nd tier WTO tariff	USD/t	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4
VIET NAM												
Tariff, sugar	%	75.8	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated. The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Refers to mainland only.
2. Production supported by a EU sugar production quota at 13.5 million tonnes of sugar and 720 kt of HFCS until 30 september 2017.
3. Refers to all current European Union member States (excludes the United Kingdom)
4. Implemented in 10 Member States.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.25.1. Meat projections: Production and trade

Calendar year

	PRODUCTION (kt cwe)[4]		Growth (%)[5]		IMPORTS (kt cwe)[6]		Growth (%)[5]		EXPORTS (kt cwe)[6]		Growth (%)[5]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**326 729**	**366 436**	**1.48**	**1.39**	**34 036**	**38 414**	**3.28**	**0.60**	**35 206**	**39 285**	**2.78**	**0.54**
NORTH AMERICA	50 483	54 725	1.42	0.49	2 677	2 954	3.24	1.08	9 576	10 712	1.36	0.39
Canada	4 953	5 467	0.98	0.69	656	814	0.32	1.28	2 046	2 524	1.59	1.30
United States	45 530	49 258	1.47	0.47	2 021	2 140	4.37	1.00	7 530	8 188	1.30	0.13
LATIN AMERICA	53 135	59 999	1.54	1.01	4 595	5 197	4.80	0.90	8 659	10 509	2.33	1.01
Argentina	5 706	6 509	2.48	0.94	54	52	-2.39	0.17	701	1 143	4.09	1.78
Brazil	26 962	29 462	1.00	0.67	45	56	1.77	0.90	6 146	7 396	1.48	1.02
Chile	1 502	1 866	1.29	1.63	661	793	13.18	0.45	374	463	4.77	0.38
Colombia	2 764	3 414	3.45	2.07	230	319	15.46	3.46	28	45	7.96	5.90
Mexico	6 860	8 099	2.36	1.44	2 026	2 169	5.15	0.41	356	393	9.89	0.24
Paraguay	677	769	3.52	2.00	37	35	5.49	1.09	345	395	5.61	2.83
Peru	1 939	2 486	4.22	2.11	93	182	14.49	7.98	3	2	-13.94	-0.72
EUROPE	63 633	65 318	1.78	0.11	5 219	5 217	-3.18	0.13	8 664	8 932	4.23	-0.27
European Union[1]	44 166	44 336	1.20	-0.06	1 556	1 764	-0.12	0.60	6 686	6 777	3.60	-0.46
United Kingdom	3 989	4 023	1.85	-0.29	1 825	1 958	1.17	1.06	797	718	1.31	-0.71
Russia	10 521	11 356	4.92	0.53	838	567	-13.60	-2.84	279	338	37.67	1.35
Ukraine	2 126	2 557	0.93	1.37	408	333	-1.17	-1.44	392	545	24.62	1.20
AFRICA	17 066	21 144	2.03	2.06	3 077	4 127	3.42	3.18	279	283	1.12	0.19
Egypt	2 078	2 710	1.68	2.29	428	478	4.09	3.27	7	6	7.01	0.05
Ethiopia	504	596	-3.23	1.62	0	0	..	..	17	14	3.48	-1.21
Nigeria	1 193	1 391	0.96	1.55	2	5	-8.58	5.85	1	1	102.50	-1.41
South Africa	3 147	4 000	2.01	2.39	634	673	6.72	0.63	150	172	4.84	1.60
ASIA	135 856	158 129	1.25	2.37	17 948	20 315	5.54	0.10	4 787	5 352	4.81	0.84
China[2]	82 137	93 330	0.26	2.82	3 869	3 646	19.67	-5.29	600	650	-1.68	2.03
India	7 244	9 126	2.35	2.07	2	4	-0.24	3.05	1 581	1 475	4.17	-0.59
Indonesia	3 243	4 146	4.32	2.30	211	382	14.01	3.55	3	2	-7.30	-2.16
Iran	3 092	3 714	2.67	1.58	189	158	-3.62	-1.16	69	77	6.90	1.16
Japan	3 359	3 149	0.65	-0.79	3 140	3 227	2.79	0.10	18	20	10.31	0.09
Kazakhstan	899	1 020	2.53	1.13	268	364	0.85	3.18	17	19	34.08	-1.98
Korea	2 500	2 637	3.37	0.22	1 434	1 599	5.94	0.58	35	50	1.71	0.00
Malaysia	2 124	2 714	3.69	2.23	341	398	5.24	1.87	208	317	6.15	4.07
Pakistan	3 769	4 866	4.52	2.17	29	34	3.64	4.34	58	67	3.49	-0.38
Philippines	3 573	4 471	2.75	1.95	604	982	9.07	5.58	8	9	-11.92	-0.42
Saudi Arabia	744	989	3.93	2.04	888	907	-1.07	0.70	69	64	2.40	-0.65
Thailand	2 992	3 683	1.65	1.41	23	19	-1.63	-1.70	1 232	1 666	7.24	1.90
Turkey	3 628	4 596	5.36	1.72	53	32	-5.94	-0.75	592	685	12.27	0.70
Viet Nam	4 948	6 183	2.75	3.64	1 525	2 103	4.96	2.93	25	14	44.26	1.10
OCEANIA	6 556	7 121	1.78	1.34	519	603	2.64	1.88	3 240	3 496	2.31	1.46
Australia	5 010	5 507	1.95	1.62	334	370	1.90	1.63	2 177	2 418	2.43	2.18
New Zealand	1 406	1 448	1.28	0.33	82	98	7.59	1.40	1 060	1 075	2.09	0.02
DEVELOPED COUNTRIES	**130 876**	**138 712**	**1.64**	**0.40**	**12 799**	**13 456**	**0.13**	**0.55**	**21 691**	**23 390**	**2.62**	**0.29**
DEVELOPING COUNTRIES	**195 853**	**227 724**	**1.37**	**2.03**	**21 236**	**24 958**	**5.62**	**0.63**	**13 515**	**15 895**	**3.04**	**0.93**
LEAST DEVELOPED COUNTRIES (LDC)	11 080	13 772	3.61	2.15	1 265	1 974	2.20	4.62	37	34	-2.42	-1.59
OECD[3]	**127 241**	**135 570**	**1.57**	**0.44**	**14 262**	**15 601**	**3.27**	**0.71**	**21 715**	**23 370**	**2.53**	**0.26**
BRICS	**130 010**	**147 274**	**0.90**	**2.12**	**5 388**	**4 946**	**5.18**	**-4.32**	**8 756**	**10 031**	**2.11**	**0.84**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.25.2. Meat projections: Consumption, food

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[4]		FOOD (kg rwe/cap)[5]		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**325 246**	**365 149**	**1.51**	**1.39**	**34.5**	**34.9**	**0.41**	**0.45**
NORTH AMERICA	43 813	47 305	1.51	0.56	96.5	97.8	0.84	-0.01
Canada	3 241	3 495	1.19	0.70	70.2	69.8	0.31	-0.03
United States	40 573	43 810	1.53	0.55	99.4	101.1	0.89	0.00
LATIN AMERICA	48 583	54 141	1.69	0.99	60.8	62.2	0.69	0.22
Argentina	5 059	5 417	2.16	0.76	89.0	87.1	1.24	-0.05
Brazil	20 687	21 985	0.95	0.56	78.8	78.8	0.14	0.02
Chile	1 778	2 179	3.66	1.47	78.2	89.1	2.75	0.84
Colombia	2 933	3 656	4.05	2.16	48.6	57.0	3.40	1.59
Mexico	8 308	9 582	2.99	1.21	53.8	56.1	1.76	0.31
Paraguay	365	405	2.11	1.20	40.5	39.9	0.74	0.13
Peru	2 029	2 666	4.62	2.42	53.2	62.6	3.37	1.41
EUROPE	59 903	61 403	0.88	0.18	64.4	66.5	0.82	0.27
European Union[1]	38 706	39 074	0.74	0.06	69.5	70.8	0.68	0.16
United Kingdom	5 012	5 263	1.67	0.26	60.6	61.1	1.06	-0.11
Russia	11 111	11 611	1.47	0.31	62.0	65.7	1.52	0.49
Ukraine	2 136	2 339	-1.38	0.96	39.8	46.5	-0.78	1.55
AFRICA	19 816	24 969	2.22	2.27	12.5	12.2	-0.31	-0.06
Egypt	2 530	3 212	2.07	2.41	20.4	21.9	0.17	0.92
Ethiopia	464	568	-3.58	1.94	3.1	3.0	-6.64	-0.24
Nigeria	1 249	1 487	0.73	1.76	5.1	4.6	-2.01	-0.77
South Africa	3 616	4 482	2.43	2.12	52.0	57.6	1.16	1.10
ASIA	149 642	173 489	1.63	2.12	26.7	28.6	0.67	1.38
China[2]	85 333	96 233	0.79	2.37	48.0	52.8	0.32	2.13
India	5 654	7 643	1.94	2.68	3.5	4.3	1.10	1.81
Indonesia	3 572	4 667	4.69	2.38	11.1	13.2	3.49	1.56
Iran	3 198	3 781	2.26	1.47	32.9	35.9	1.05	0.81
Japan	6 468	6 357	1.64	-0.37	40.8	42.1	1.83	0.10
Kazakhstan	1 152	1 369	1.90	1.69	49.4	53.8	0.51	0.93
Korea	3 867	4 187	4.07	0.36	59.8	64.6	3.68	0.37
Malaysia	2 276	2 813	3.58	1.97	60.5	65.6	2.00	0.79
Pakistan	3 734	4 826	4.55	2.23	14.7	15.9	2.64	0.60
Philippines	4 176	5 451	3.58	2.51	31.8	35.9	2.06	1.19
Saudi Arabia	1 701	1 987	1.07	1.38	43.6	43.6	-1.38	0.03
Thailand	1 641	1 734	-1.02	0.69	19.3	20.3	-1.35	0.67
Turkey	3 253	3 994	4.35	1.83	32.6	37.1	2.63	1.30
Viet Nam	6 499	8 314	3.26	3.44	53.2	62.6	2.09	2.62
OCEANIA	3 487	3 843	1.41	1.07	69.9	67.9	0.04	-0.06
Australia	2 815	3 078	1.30	1.01	91.6	89.7	-0.01	0.03
New Zealand	432	467	2.12	0.77	74.8	74.5	1.35	0.07
DEVELOPED COUNTRIES	**121 606**	**128 558**	**1.25**	**0.43**	**68.6**	**70.9**	**0.91**	**0.24**
DEVELOPING COUNTRIES	**203 640**	**236 591**	**1.67**	**1.95**	**26.6**	**27.4**	**0.38**	**0.83**
LEAST DEVELOPED COUNTRIES (LDC)	12 187	15 588	3.51	2.46	11.3	11.4	1.17	0.25
OECD[3]	**119 252**	**127 285**	**1.59**	**0.50**	**69.3**	**71.6**	**1.09**	**0.22**
BRICS	**126 401**	**141 954**	**0.97**	**1.90**	**31.9**	**33.7**	**0.24**	**1.34**

Note: Calendar year; except year ending 30 September New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.26.1. Beef and veal projections: Production and trade

Calendar year

	PRODUCTION (kt cwe)[4]		Growth (%)[5]		IMPORTS (kt cwe)[6]		Growth (%)[5]		EXPORTS (kt cwe)[6]		Growth (%)[5]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**69 774**	**76 005**	**0.88**	**0.75**	**10 102**	**11 496**	**4.42**	**0.81**	**10 168**	**11 510**	**3.32**	**0.78**
NORTH AMERICA	13 210	14 061	0.40	0.48	1 584	1 705	3.76	0.74	1 912	2 257	2.81	0.79
Canada	1 449	1 605	0.07	0.47	216	253	-1.24	0.69	531	756	3.61	1.78
United States	11 761	12 456	0.45	0.48	1 369	1 452	4.79	0.75	1 381	1 502	2.58	0.32
LATIN AMERICA	17 933	19 476	0.92	0.75	729	844	0.88	0.84	3 092	3 992	5.15	0.86
Argentina	2 910	3 302	1.53	0.76	7	7	9.89	0.00	458	802	8.49	1.45
Brazil	9 138	9 816	0.60	0.56	33	47	0.67	1.26	1 436	1 942	4.44	0.79
Chile	214	264	0.98	1.10	300	384	7.99	1.45	15	21	6.09	-1.40
Colombia	748	787	-1.68	1.84	6	7	14.05	-1.44	23	42	18.75	6.39
Mexico	1 968	2 204	1.39	1.19	138	135	-3.86	-0.15	215	224	11.25	-0.04
Paraguay	458	515	4.26	2.43	8	4	16.59	-2.80	335	381	5.31	2.88
Peru	190	215	0.83	1.32	7	6	4.34	-0.23	0	0	..	..
EUROPE	10 811	10 331	0.05	-0.47	1 309	1 343	-2.77	0.78	1 026	1 029	2.65	0.45
European Union[1]	7 256	6 822	0.26	-0.64	370	401	1.06	1.49	605	647	2.64	0.56
United Kingdom	899	828	0.08	-0.85	344	370	1.60	2.12	129	91	-1.58	-0.19
Russia	1 603	1 649	-0.38	0.10	444	405	-8.71	-0.63	7	8	69.13	0.00
Ukraine	362	345	-1.87	0.14	3	3	-12.36	-0.28	49	48	17.42	0.56
AFRICA	6 623	7 894	1.81	1.78	635	892	0.09	4.19	86	108	-2.02	3.36
Egypt	799	910	-0.35	0.90	293	415	1.81	4.46	1	1	14.59	-0.35
Ethiopia	415	493	0.23	1.67	0	0	..	..	2	1	20.59	-2.33
Nigeria	325	376	2.80	1.40	1	2	-3.59	1.15	1	1	126.37	-1.40
South Africa	1 009	1 362	2.27	3.41	21	16	-5.77	-2.19	53	86	6.53	5.81
ASIA	17 909	20 765	1.35	1.08	5 813	6 678	8.46	0.45	1 881	1 802	3.82	-0.44
China[2]	6 497	7 141	0.72	0.40	1 155	1 218	56.90	-3.81	61	35	-5.40	1.46
India	2 536	2 653	-0.10	0.28	0	0	..	..	1 554	1 468	4.19	-0.51
Indonesia	431	473	1.42	1.05	206	376	14.05	3.55	1	1	-5.54	-0.28
Iran	502	704	4.75	2.54	154	109	-2.72	-1.61	3	4	53.91	0.20
Japan	474	416	-1.10	-1.44	868	918	2.27	0.19	5	6	27.50	0.00
Kazakhstan	467	518	2.53	0.89	50	88	1.92	4.71	6	7	36.39	-1.44
Korea	283	306	0.11	0.58	527	605	6.46	0.46	4	4	1.75	0.00
Malaysia	35	47	8.06	2.35	200	270	3.69	2.85	9	7	0.49	-2.78
Pakistan	1 904	2 394	3.02	2.16	1	1	-9.09	0.01	48	57	7.89	-0.06
Philippines	302	359	0.09	1.84	174	221	5.30	2.17	3	4	-5.68	-0.38
Saudi Arabia	42	61	-0.66	3.76	152	193	0.05	1.98	15	12	-7.27	-1.94
Thailand	205	266	-2.19	1.78	17	12	0.36	-3.04	43	70	4.25	3.13
Turkey	912	1 362	6.33	2.28	31	9	-7.90	-2.39	18	31	3.22	1.58
Viet Nam	372	531	-0.33	2.91	849	882	13.07	2.44	2	2	60.21	-0.26
OCEANIA	3 287	3 478	1.22	1.56	31	33	-1.12	1.16	2 171	2 321	1.82	1.73
Australia	2 610	2 823	1.26	2.06	12	8	-0.85	0.00	1 573	1 750	1.52	2.59
New Zealand	667	645	1.10	-0.31	9	10	5.94	-0.03	595	569	2.66	-0.50
DEVELOPED COUNTRIES	**30 642**	**31 828**	**0.50**	**0.41**	**4 024**	**4 290**	**0.84**	**0.74**	**5 173**	**5 708**	**2.40**	**1.15**
DEVELOPING COUNTRIES	**39 132**	**44 176**	**1.19**	**1.00**	**6 079**	**7 206**	**7.50**	**0.86**	**4 995**	**5 801**	**4.39**	**0.43**
LEAST DEVELOPED COUNTRIES (LDC)	3 873	4 605	2.52	1.74	172	259	0.62	5.66	11	9	-0.85	-1.80
OECD[3]	**29 556**	**30 837**	**0.58**	**0.42**	**4 349**	**4 778**	**3.03**	**0.87**	**5 096**	**5 644**	**2.51**	**1.11**
BRICS	**20 783**	**22 620**	**0.54**	**0.59**	**1 653**	**1 687**	**7.99**	**-2.98**	**3 111**	**3 539**	**4.04**	**0.32**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.26.2. Beef and veal projections: Consumption, food

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[4]		FOOD (kg rwe/cap)[5]		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**69 479**	**75 728**	**0.94**	**0.75**	**6.4**	**6.3**	**-0.22**	**-0.19**
NORTH AMERICA	13 158	13 830	0.36	0.49	25.3	24.9	-0.37	-0.09
Canada	959	928	-0.53	-0.25	18.1	16.0	-1.54	-1.03
United States	12 199	12 902	0.44	0.55	26.1	26.0	-0.26	0.00
LATIN AMERICA	15 071	15 769	0.20	0.71	16.4	15.7	-0.85	-0.07
Argentina	2 459	2 507	0.55	0.55	38.8	36.0	-0.46	-0.28
Brazil	7 562	7 784	0.21	0.53	25.3	24.4	-0.63	-0.01
Chile	488	609	4.27	1.45	18.8	21.8	3.39	0.82
Colombia	698	719	-2.09	1.68	9.9	9.5	-2.98	1.10
Mexico	1 657	1 810	0.93	1.07	9.2	9.1	-0.31	0.16
Paraguay	128	135	3.19	1.13	13.0	12.1	1.85	0.07
Peru	197	221	0.94	1.28	4.2	4.2	-0.34	0.26
EUROPE	10 889	10 508	-0.88	-0.36	10.2	9.9	-1.04	-0.29
European Union[1]	6 791	6 412	-0.06	-0.58	10.7	10.1	-0.20	-0.50
United Kingdom	1 114	1 107	0.75	0.00	11.6	11.0	0.06	-0.37
Russia	2 075	2 080	-3.68	-0.05	10.0	10.1	-3.87	0.12
Ukraine	307	291	-3.81	0.07	4.9	4.9	-3.33	0.63
AFRICA	7 198	8 763	1.61	2.04	4.0	3.7	-0.95	-0.30
Egypt	1 122	1 354	0.23	1.85	7.9	8.0	-1.83	0.31
Ethiopia	391	477	0.14	1.96	2.5	2.4	-2.37	-0.21
Nigeria	375	462	2.16	2.06	1.3	1.3	-0.50	-0.44
South Africa	955	1 265	1.14	3.15	11.7	13.8	-0.20	2.17
ASIA	22 342	26 028	2.76	0.99	3.5	3.7	1.74	0.28
China[2]	7 632	8 351	3.10	-0.36	3.7	4.0	2.57	-0.55
India	982	1 185	-4.22	1.35	0.5	0.6	-5.34	0.43
Indonesia	773	1 012	3.83	2.00	2.0	2.4	2.61	1.14
Iran	657	814	2.49	1.86	5.6	6.4	1.29	1.22
Japan	1 326	1 330	1.00	-0.44	7.3	7.7	1.15	0.01
Kazakhstan	514	602	2.23	1.39	19.5	20.9	0.79	0.59
Korea	806	907	4.09	0.50	11.0	12.4	3.69	0.51
Malaysia	242	326	3.10	2.78	5.3	6.3	1.46	1.60
Pakistan	1 851	2 332	2.92	2.23	6.5	6.8	0.86	0.60
Philippines	481	584	2.11	1.96	3.2	3.3	0.50	0.59
Saudi Arabia	179	242	0.52	2.63	3.7	4.3	-1.91	1.29
Thailand	129	126	-4.28	0.30	1.3	1.3	-4.61	0.26
Turkey	1 089	1 391	6.08	2.06	9.3	11.1	4.45	1.55
Viet Nam	1 270	1 453	7.54	2.53	9.2	9.6	6.38	1.72
OCEANIA	821	830	-1.52	0.29	14.2	12.6	-2.98	-0.87
Australia	722	724	-1.17	0.23	20.3	18.1	-2.57	-0.77
New Zealand	80	83	-3.78	0.46	11.8	11.3	-4.74	-0.25
DEVELOPED COUNTRIES	**29 261**	**30 272**	**0.01**	**0.31**	**14.4**	**14.5**	**-0.42**	**0.11**
DEVELOPING COUNTRIES	**40 218**	**45 456**	**1.66**	**1.05**	**4.6**	**4.6**	**0.31**	**-0.05**
LEAST DEVELOPED COUNTRIES (LDC)	3 984	4 826	2.43	2.00	3.2	3.1	0.06	-0.22
OECD[3]	**28 460**	**29 531**	**0.57**	**0.34**	**14.4**	**14.4**	**0.00**	**0.05**
BRICS	**19 207**	**20 665**	**0.50**	**0.28**	**4.2**	**4.3**	**-0.31**	**-0.24**

Note: Calendar year; except year ending 30 September New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.27.1. Pigmeat projections: Production and trade

Calendar year

	PRODUCTION (kt cwe)[4]		Growth (%)[5]		IMPORTS (kt cwe)[6]		Growth (%)[5]		EXPORTS (kt cwe)[6]		Growth (%)[5]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**116 595**	**127 526**	**0.56**	**2.14**	**9 213**	**9 725**	**4.18**	**-0.53**	**9 403**	**9 708**	**2.97**	**-0.67**
NORTH AMERICA	13 952	15 055	2.09	0.29	710	845	2.80	1.92	4 062	4 467	2.54	-0.06
Canada	2 063	2 210	0.81	0.52	238	317	2.04	1.55	1 370	1 610	1.71	1.07
United States	11 889	12 844	2.32	0.25	471	528	3.20	2.15	2 692	2 857	2.99	-0.65
LATIN AMERICA	8 381	9 893	2.77	1.12	1 608	1 872	10.88	0.90	939	1 057	4.17	-0.91
Argentina	599	704	9.93	0.94	40	39	-0.67	0.22	16	19	13.17	0.65
Brazil	3 938	4 454	2.30	0.62	2	1	10.69	0.00	564	617	2.77	-1.72
Chile	517	637	-0.30	1.81	209	264	37.22	-0.25	193	231	4.46	0.25
Colombia	387	526	7.86	1.59	126	193	28.74	5.06	1	0	..	..
Mexico	1 497	1 873	3.15	1.80	885	949	9.32	0.10	137	162	9.95	0.43
Paraguay	194	227	2.38	1.50	3	3	5.72	-2.12	5	10	63.36	4.00
Peru	160	195	4.21	1.79	12	21	14.72	13.27	0	0	..	..
EUROPE	29 506	29 343	1.21	-0.09	1 320	1 350	-6.59	0.77	4 138	3 906	3.46	-1.36
European Union[1]	23 056	22 570	0.62	-0.20	164	209	0.71	0.75	3 734	3 486	3.51	-1.54
United Kingdom	875	867	2.38	-0.08	786	807	0.17	0.72	241	262	4.03	0.65
Russia	3 704	4 023	6.02	0.41	152	111	-23.37	1.97	84	89	85.46	0.28
Ukraine	707	769	0.85	1.04	27	9	-26.27	-6.51	4	3	-9.28	1.01
AFRICA	1 501	1 929	3.62	2.23	281	488	1.70	6.23	29	29	20.09	-3.08
Egypt	0	0	..	..	1	0	..	..	0	0	..	..
Ethiopia	2	2	1.37	0.90	0	0	..	..	0	0	..	..
Nigeria	278	341	2.07	2.05	1	2	..	5.17	0	0	..	..
South Africa	250	326	2.99	1.54	40	39	0.52	3.31	25	26	31.67	-3.20
ASIA	62 708	70 721	-0.42	3.85	4 892	4 717	7.90	-2.33	186	197	-2.88	2.41
China[2]	50 450	56 975	-0.90	4.44	1 772	1 527	23.11	-6.40	94	104	-7.40	8.24
India	300	272	-2.72	-0.93	1	2	0.22	5.14	1	0	..	..
Indonesia	361	419	5.63	1.31	2	2	18.13	-0.07	0	0	..	..
Iran	0	0	..	..	2	2	14.97	0.00	2	2	14.97	0.00
Japan	1 282	1 115	-0.05	-1.49	1 332	1 359	2.78	0.12	3	4	22.42	0.49
Kazakhstan	87	80	-2.70	-0.54	30	38	-4.10	2.54	1	2	180.97	-0.59
Korea	1 324	1 354	3.68	-0.08	708	769	5.89	0.83	2	2	13.60	0.00
Malaysia	195	207	-1.86	-0.14	30	30	9.77	5.87	4	4	-1.59	-2.22
Pakistan	0	0	..	..	0	0	..	..	0	0	..	..
Philippines	1 894	2 320	2.14	1.88	150	142	6.29	0.76	2	2	-7.09	-0.06
Saudi Arabia	0	0	..	..	24	22	15.93	0.00	4	4	288.81	0.00
Thailand	1 006	1 167	-0.02	0.74	1	1	-12.06	1.60	24	36	2.24	-2.72
Turkey	0	0	..	..	13	14	1.81	-0.01	13	14	1.81	0.01
Viet Nam	3 574	4 327	1.89	4.29	70	118	6.39	-3.33	24	13	50.50	1.28
OCEANIA	548	585	1.64	1.01	402	452	2.85	1.63	50	51	-0.55	1.91
Australia	404	423	2.11	1.00	322	361	2.00	1.67	48	50	-0.80	1.96
New Zealand	47	45	-0.62	-0.23	68	84	8.11	1.67	1	1	..	-0.06
DEVELOPED COUNTRIES	**45 625**	**46 491**	**1.44**	**0.01**	**3 861**	**4 125**	**-1.35**	**0.93**	**8 281**	**8 458**	**3.02**	**-0.70**
DEVELOPING COUNTRIES	**70 971**	**81 036**	**-0.01**	**3.55**	**5 352**	**5 600**	**10.26**	**-1.49**	**1 123**	**1 250**	**2.62**	**-0.47**
LEAST DEVELOPED COUNTRIES (LDC)	2 022	2 610	5.19	2.56	155	321	-0.10	7.41	0	0	-15.44	..
OECD[3]	**43 735**	**44 873**	**1.29**	**0.07**	**5 339**	**5 874**	**4.29**	**0.79**	**8 437**	**8 680**	**3.11**	**-0.65**
BRICS	**58 642**	**66 049**	**-0.33**	**3.82**	**1 967**	**1 680**	**7.11**	**-5.85**	**767**	**835**	**2.87**	**-0.81**

.. Not available

Note: Calendar year; except year ending 30 September New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.27.2. Pigmeat projections: Consumption, food

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[4]		FOOD (kg rwe/cap)[5]		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**116 269**	**127 278**	**0.63**	**2.14**	**11.9**	**11.8**	**-0.53**	**1.20**
NORTH AMERICA	10 592	11 424	2.01	0.54	22.7	22.9	1.27	-0.04
Canada	786	797	0.59	0.40	16.5	15.3	-0.43	-0.40
United States	9 805	10 627	2.13	0.55	23.4	23.8	1.42	0.00
LATIN AMERICA	9 058	10 714	3.74	1.31	11.0	11.9	2.66	0.53
Argentina	623	724	8.72	0.91	10.9	11.6	7.63	0.08
Brazil	3 376	3 838	2.22	1.05	12.6	13.4	1.36	0.51
Chile	533	671	3.68	1.50	22.8	26.8	2.81	0.87
Colombia	513	719	10.60	2.42	8.1	10.6	9.60	1.82
Mexico	2 252	2 666	4.88	1.24	13.9	14.9	3.59	0.33
Paraguay	192	220	2.09	1.35	21.7	22.0	0.77	0.28
Peru	172	216	4.82	2.49	4.1	4.6	3.49	1.46
EUROPE	26 673	26 772	0.36	0.15	27.9	28.1	0.20	0.23
European Union[1]	19 441	19 246	0.14	0.07	34.1	33.9	0.00	0.15
United Kingdom	1 420	1 412	0.87	0.23	16.5	15.7	0.18	-0.14
Russia	3 772	4 045	1.93	0.45	20.2	21.9	1.73	0.62
Ukraine	732	778	-1.80	0.90	13.0	14.6	-1.31	1.46
AFRICA	1 754	2 389	3.13	3.02	1.1	1.1	0.53	0.66
Egypt	1	0	-3.94	..	0.0	0.0	-5.91	0.49
Ethiopia	2	2	1.11	1.01	0.0	0.0	-1.42	-1.15
Nigeria	280	343	2.11	2.05	1.1	1.0	-0.54	-0.45
South Africa	264	339	1.50	2.20	3.6	4.1	0.16	1.24
ASIA	67 293	74 994	0.06	3.34	11.6	11.9	-0.94	2.61
China[2]	52 014	58 277	-0.45	3.95	28.4	31.1	-0.97	3.76
India	301	274	-2.71	-0.89	0.2	0.1	-3.85	-1.79
Indonesia	348	399	6.25	1.37	1.0	1.1	5.01	0.52
Iran	0	0	..	..	0.0	0.0	-1.17	-0.63
Japan	2 614	2 471	1.30	-0.64	16.0	15.9	1.45	-0.19
Kazakhstan	116	116	-3.28	0.38	4.9	4.5	-4.65	-0.41
Korea	1 998	2 121	3.88	0.24	30.5	32.3	3.48	0.25
Malaysia	221	233	-0.77	0.51	5.4	5.0	-2.34	-0.64
Pakistan	0	0	..	..	0.0	0.0	13.70	-1.59
Philippines	2 042	2 459	2.41	1.81	15.0	15.5	0.79	0.45
Saudi Arabia	20	18	13.64	0.00	0.5	0.4	10.88	-1.30
Thailand	879	914	-0.16	0.40	9.9	10.2	-0.51	0.36
Turkey	0	0	..	..	0.0	0.0	-1.54	-0.51
Viet Nam	3 621	4 432	1.91	4.03	29.3	32.7	0.82	3.20
OCEANIA	900	985	2.30	1.24	17.3	16.7	0.78	0.08
Australia	678	735	2.28	1.26	21.2	20.5	0.83	0.24
New Zealand	114	129	3.79	0.97	18.8	19.5	2.75	0.25
DEVELOPED COUNTRIES	**41 185**	**42 133**	**0.86**	**0.25**	**22.6**	**22.5**	**0.43**	**0.04**
DEVELOPING COUNTRIES	**75 084**	**85 146**	**0.49**	**3.20**	**9.5**	**9.5**	**-0.84**	**2.09**
LEAST DEVELOPED COUNTRIES (LDC)	2 188	2 943	4.75	2.98	2.0	2.1	2.32	0.74
OECD[3]	**40 561**	**42 017**	**1.29**	**0.32**	**22.9**	**22.9**	**0.73**	**0.03**
BRICS	**59 726**	**66 774**	**-0.17**	**3.50**	**14.6**	**15.3**	**-0.98**	**2.96**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.28.1. Poultry meat projections: Production and trade

Calendar year

	PRODUCTION (kt rtc)		Growth (%)[4]		IMPORTS (kt rtc)		Growth (%)[4]		EXPORTS (kt rtc)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**125 312**	**145 711**	**2.72**	**1.11**	**13 552**	**15 897**	**1.93**	**1.20**	**14 421**	**16 766**	**2.32**	**1.13**
NORTH AMERICA	23 230	25 507	1.65	0.61	244	284	0.40	1.32	3 599	3 985	-0.47	0.69
Canada	1 425	1 636	2.30	1.17	176	218	-0.15	1.75	145	158	-4.41	1.35
United States	21 806	23 870	1.61	0.57	68	66	1.93	0.00	3 454	3 827	-0.28	0.67
LATIN AMERICA	26 444	30 231	1.64	1.14	2 232	2 455	3.01	0.92	4 609	5 441	0.47	1.54
Argentina	2 146	2 446	2.39	1.18	7	6	-11.15	0.00	226	321	-1.55	2.73
Brazil	13 767	15 066	0.92	0.76	4	3	9.71	-2.18	4 147	4 838	0.44	1.52
Chile	756	950	2.69	1.67	152	145	10.31	-0.70	161	206	5.44	0.71
Colombia	1 621	2 093	5.66	2.28	97	119	8.12	1.60	4	2	-7.74	-0.15
Mexico	3 332	3 952	2.64	1.41	994	1 074	4.04	0.76	4	7	-12.88	6.88
Paraguay	21	23	0.23	-1.26	26	28	3.32	2.22	5	5	81.24	-2.17
Peru	1 551	2 036	4.86	2.28	74	156	15.98	7.85	3	1	-14.49	-0.79
EUROPE	22 046	24 360	3.69	0.62	2 313	2 255	-1.09	-0.55	3 332	3 826	6.03	0.77
European Union[1]	13 207	14 295	2.95	0.47	854	993	-0.31	0.40	2 295	2 595	3.99	0.96
United Kingdom	1 913	2 025	2.77	-0.20	597	683	3.06	1.09	328	268	1.81	-2.26
Russia	4 987	5 450	6.48	0.77	239	48	-13.33	-14.43	179	226	31.31	1.95
Ukraine	1 044	1 429	2.22	1.89	378	321	5.44	-1.25	339	494	28.93	1.27
AFRICA	5 804	7 555	2.47	2.44	2 136	2 726	5.00	2.47	134	119	1.93	-1.23
Egypt	1 153	1 658	3.59	3.25	134	62	13.14	-2.64	6	5	5.92	0.30
Ethiopia	14	17	-19.44	1.79	0	0	..	..	0	0	..	..
Nigeria	198	206	-0.83	0.51	0	2	-13.19	..	0	0	..	..
South Africa	1 730	2 138	2.00	2.03	566	614	8.27	0.62	71	60	0.66	-0.50
ASIA	46 259	56 269	3.52	1.38	6 566	8 087	1.97	1.39	2 681	3 318	6.52	1.52
China[2]	20 433	23 608	2.56	0.56	622	493	3.04	-8.03	444	510	0.86	1.30
India	3 665	5 399	5.81	3.49	1	1	..	0.97	6	5	-1.92	-4.78
Indonesia	2 324	3 109	4.92	2.71	0	0	-9.39	..	2	2	-7.61	-2.80
Iran	2 217	2 639	3.04	1.57	0	1	-68.08	-0.15	64	71	6.39	1.25
Japan	1 602	1 617	1.84	-0.10	916	930	3.53	0.03	10	10	4.37	0.00
Kazakhstan	173	222	7.00	2.14	187	237	1.69	2.76	9	10	33.60	-2.45
Korea	892	975	4.24	0.53	182	207	4.20	0.09	29	44	0.70	0.00
Malaysia	1 892	2 457	4.37	2.45	75	51	7.09	-4.23	194	306	6.77	4.41
Pakistan	1 393	1 933	8.74	2.45	28	33	4.42	4.56	7	7	9.84	-1.42
Philippines	1 316	1 719	4.53	2.07	279	615	14.35	8.81	3	3	-19.01	-0.74
Saudi Arabia	702	928	4.53	1.94	676	663	-1.28	0.36	47	47	7.17	-0.35
Thailand	1 778	2 248	3.35	1.73	4	4	-4.63	0.57	1 165	1 560	7.56	1.99
Turkey	2 316	2 820	5.04	1.67	8	7	-0.24	0.30	561	640	13.04	0.68
Viet Nam	985	1 304	7.87	1.98	605	1 101	-1.32	4.29	0	0	..	..
OCEANIA	1 529	1 790	3.36	1.34	61	89	5.70	3.78	65	78	6.21	2.57
Australia	1 261	1 484	2.96	1.35	0	0	..	..	43	48	2.39	2.39
New Zealand	236	267	5.90	1.14	1	1	..	0.00	22	29	18.99	2.93
DEVELOPED COUNTRIES	**51 103**	**56 620**	**2.59**	**0.69**	**4 463**	**4 619**	**0.95**	**0.14**	**7 102**	**7 981**	**2.28**	**0.73**
DEVELOPING COUNTRIES	**74 209**	**89 092**	**2.81**	**1.39**	**9 089**	**11 278**	**2.44**	**1.67**	**7 319**	**8 786**	**2.36**	**1.52**
LEAST DEVELOPED COUNTRIES (LDC)	3 059	3 969	4.88	2.49	933	1 388	2.94	3.90	23	22	-0.81	-1.65
OECD[3]	**51 191**	**56 989**	**2.46**	**0.74**	**4 106**	**4 505**	**2.69**	**0.54**	**7 067**	**7 845**	**1.83**	**0.67**
BRICS	**44 583**	**51 661**	**2.61**	**0.97**	**1 431**	**1 159**	**-0.29**	**-4.92**	**4 847**	**5 639**	**0.93**	**1.49**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.28.2. Poultry meat projections: Consumption, food

Calendar year

	CONSUMPTION (kt rtc)		Growth (%)[4]		FOOD (kg rwe/cap)[5]		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**124 419**	**144 874**	**2.68**	**1.12**	**14.4**	**15.1**	**1.50**	**0.19**
NORTH AMERICA	19 845	21 838	2.03	0.62	48.0	49.5	1.29	0.04
Canada	1 454	1 729	2.79	1.41	34.5	37.6	1.77	0.61
United States	18 392	20 110	1.97	0.55	49.5	50.9	1.27	0.00
LATIN AMERICA	24 066	27 245	2.00	1.04	32.9	34.1	0.93	0.27
Argentina	1 928	2 131	2.78	0.96	38.2	38.5	1.74	0.13
Brazil	9 624	10 232	1.13	0.42	40.4	40.4	0.28	-0.12
Chile	748	888	3.30	1.48	36.2	40.0	2.44	0.85
Colombia	1 714	2 210	5.85	2.25	30.5	36.8	4.89	1.66
Mexico	4 322	5 019	2.97	1.26	30.1	31.6	1.70	0.36
Paraguay	42	46	0.90	0.81	5.3	5.2	-0.41	-0.26
Peru	1 622	2 190	5.28	2.59	43.8	52.8	3.95	1.56
EUROPE	21 024	22 789	2.75	0.47	24.8	27.0	2.59	0.54
European Union[1]	11 767	12 693	2.50	0.37	23.3	25.2	2.35	0.44
United Kingdom	2 176	2 440	2.96	0.41	28.5	30.6	2.26	0.03
Russia	5 050	5 271	4.03	0.35	30.5	32.3	3.82	0.53
Ukraine	1 082	1 255	-0.18	1.23	21.6	26.6	0.32	1.79
AFRICA	7 806	10 163	3.11	2.50	5.4	5.4	0.52	0.15
Egypt	1 282	1 715	4.30	2.99	11.4	12.8	2.16	1.44
Ethiopia	14	17	-19.31	1.82	0.1	0.1	-21.33	-0.35
Nigeria	199	208	-1.43	0.57	0.9	0.7	-3.99	-1.89
South Africa	2 225	2 692	3.37	1.75	34.1	37.0	2.00	0.79
ASIA	50 153	61 037	3.17	1.37	9.7	10.9	2.14	0.67
China[2]	20 612	23 591	2.63	0.28	12.7	14.2	2.09	0.09
India	3 659	5 395	5.83	3.50	2.4	3.2	4.59	2.56
Indonesia	2 322	3 108	4.94	2.71	7.7	9.3	3.71	1.85
Iran	2 153	2 569	2.59	1.58	23.1	25.5	1.39	0.94
Japan	2 504	2 537	2.41	-0.05	17.3	18.4	2.56	0.40
Kazakhstan	351	450	3.64	2.60	16.8	19.6	2.17	1.79
Korea	1 044	1 139	4.29	0.47	18.0	19.6	3.88	0.48
Malaysia	1 773	2 202	4.23	1.99	48.7	53.1	2.58	0.82
Pakistan	1 414	1 958	8.62	2.50	6.2	7.2	6.44	0.87
Philippines	1 592	2 331	5.94	3.48	13.1	16.6	4.27	2.09
Saudi Arabia	1 331	1 544	1.16	1.30	34.9	34.8	-1.30	-0.02
Thailand	629	691	-1.32	1.15	8.0	8.7	-1.66	1.11
Turkey	1 763	2 187	3.35	1.98	18.9	21.9	1.76	1.47
Viet Nam	1 590	2 404	3.52	2.97	14.5	20.0	2.41	2.16
OCEANIA	1 525	1 801	3.34	1.39	33.1	34.4	1.80	0.23
Australia	1 218	1 435	2.98	1.32	43.1	45.2	1.52	0.31
New Zealand	214	238	5.11	0.93	39.8	40.8	4.06	0.22
DEVELOPED COUNTRIES	**48 427**	**53 290**	**2.46**	**0.64**	**30.0**	**32.1**	**2.03**	**0.44**
DEVELOPING COUNTRIES	**75 992**	**91 584**	**2.82**	**1.41**	**10.8**	**11.5**	**1.46**	**0.31**
LEAST DEVELOPED COUNTRIES (LDC)	3 969	5 336	4.48	2.86	4.0	4.3	2.05	0.62
OECD[3]	**48 189**	**53 681**	**2.56**	**0.74**	**30.7**	**33.0**	**1.99**	**0.45**
BRICS	**41 170**	**47 181**	**2.71**	**0.72**	**11.3**	**12.2**	**1.88**	**0.20**

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.29.1. Sheep meat projections: Production and trade

Calendar year

	PRODUCTION (kt cwe)[4]		Growth (%)[5]		IMPORTS (kt cwe)[6]		Growth (%)[5]		EXPORTS (kt cwe)[6]		Growth (%)[5]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**15 047**	**17 194**	**1.67**	**1.21**	**1 169**	**1 297**	**3.72**	**0.62**	**1 213**	**1 301**	**2.46**	**0.68**
NORTH AMERICA	90	103	-0.77	1.28	139	120	5.51	-0.20	3	3	-12.03	-0.06
Canada	16	16	0.47	0.03	26	26	3.63	0.06	0	0	..	..
United States	74	87	-1.02	1.53	113	93	5.97	-0.27	3	3	-12.26	-0.06
LATIN AMERICA	377	399	-0.54	0.50	25	25	-1.71	0.33	19	19	-5.29	-0.02
Argentina	51	56	-1.73	0.93	0	0	..	..	2	2	-14.21	0.10
Brazil	118	126	0.76	0.49	6	5	2.44	0.30	0	0	..	..
Chile	14	16	-1.72	0.52	0	0	..	..	5	5	-2.78	0.99
Colombia	8	8	-2.80	0.02	0	0	..	..	0	0	..	..
Mexico	63	71	1.54	1.14	9	10	-3.60	0.16	0	0	..	..
Paraguay	4	4	1.00	0.51	0	0	..	..	0	0	..	..
Peru	39	39	-0.55	0.10	0	0	..	..	0	0	..	..
EUROPE	1 271	1 285	0.65	-0.02	277	269	-2.45	-0.25	168	171	1.06	0.03
European Union[1]	647	649	0.15	-0.21	168	161	-2.14	-0.40	53	49	5.17	-1.06
United Kingdom	302	304	0.45	0.11	98	97	-2.22	-0.11	98	97	-1.76	0.08
Russia	227	234	2.77	0.16	3	3	-15.51	0.53	9	14	157.82	0.00
Ukraine	14	14	-5.40	0.16	0	0	..	..	0	0	..	..
AFRICA	3 138	3 765	1.06	1.84	25	20	-1.99	-2.26	29	27	-1.10	0.25
Egypt	126	142	-0.22	1.19	0	0	-38.01	..	0	0	..	..
Ethiopia	72	84	-11.16	1.35	0	0	..	..	15	13	3.44	-1.11
Nigeria	392	468	-0.01	1.80	0	0	..	..	0	0	..	..
South Africa	158	174	-0.73	1.05	7	4	0.26	-5.19	1	1	13.65	0.72
ASIA	8 979	10 374	2.20	1.22	678	834	8.11	1.12	40	35	-2.62	1.45
China[2]	4 756	5 607	2.60	1.30	320	408	19.63	-0.05	1	1	-26.29	-0.35
India	743	802	-0.44	0.86	0	0	..	..	20	2	5.64	-16.64
Indonesia	128	144	1.73	1.15	2	4	12.72	6.25	0	0	..	..
Iran	374	371	-1.30	0.03	32	45	16.37	-0.02	0	0	..	..
Japan	0	0	..	..	24	19	-2.87	-1.87	0	0	..	..
Kazakhstan	172	200	2.14	1.43	0	1	..	..	1	0	43.99	..
Korea	2	2	2.45	0.00	17	18	20.22	0.10	0	0	..	..
Malaysia	2	3	2.05	2.37	36	47	8.00	3.33	0	0	..	..
Pakistan	472	539	0.86	1.25	0	0	..	..	3	3	-17.67	-3.29
Philippines	61	73	1.34	1.75	1	4	3.94	21.12	0	0	..	..
Saudi Arabia	0	0	-65.90	..	36	29	-6.65	1.12	2	1	-7.08	-1.11
Thailand	2	3	5.44	0.92	1	2	7.00	3.65	0	0	..	..
Turkey	400	414	4.96	0.34	1	1	4.00	-1.23	0	0	..	..
Viet Nam	17	22	10.66	2.74	1	2	42.74	6.85	0	0	..	..
OCEANIA	1 193	1 268	1.54	0.91	25	29	-0.95	1.42	955	1 046	3.44	0.79
Australia	735	777	2.76	0.96	0	0	..	..	513	569	6.21	1.04
New Zealand	457	491	-0.16	0.84	4	4	2.67	0.00	442	476	0.92	0.51
DEVELOPED COUNTRIES	**3 506**	**3 774**	**1.56**	**0.77**	**452**	**423**	**-0.46**	**-0.27**	**1 135**	**1 243**	**3.09**	**0.80**
DEVELOPING COUNTRIES	**11 541**	**13 421**	**1.71**	**1.34**	**717**	**874**	**7.39**	**1.09**	**78**	**58**	**-4.28**	**-1.66**
LEAST DEVELOPED COUNTRIES (LDC)	2 127	2 588	2.62	2.00	4	5	6.49	2.22	3	2	-6.90	0.06
OECD[3]	**2 759**	**2 871**	**1.36**	**0.47**	**469**	**444**	**0.06**	**-0.20**	**1 114**	**1 200**	**2.85**	**0.65**
BRICS	**6 002**	**6 944**	**2.05**	**1.19**	**336**	**420**	**16.55**	**-0.11**	**30**	**18**	**5.14**	**-4.36**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.29.2. Sheep meat projections: Consumption, food

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[4]		FOOD (kg rwe/cap)[5]		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**15 079**	**17 269**	**1.86**	**1.20**	**1.7**	**1.8**	**0.69**	**0.26**
NORTH AMERICA	219	213	3.10	0.48	0.5	0.5	2.35	-0.09
Canada	42	42	2.09	0.05	1.0	0.9	1.06	-0.74
United States	177	171	3.35	0.59	0.5	0.4	2.63	0.04
LATIN AMERICA	388	412	-0.25	0.50	0.5	0.5	-1.30	-0.28
Argentina	49	54	-0.69	0.96	1.0	1.0	-1.69	0.12
Brazil	125	131	0.73	0.47	0.5	0.5	-0.12	-0.07
Chile	9	10	-0.97	0.29	0.4	0.5	-1.81	-0.34
Colombia	8	8	-2.71	0.09	0.1	0.1	-3.59	-0.49
Mexico	77	86	1.17	0.89	0.5	0.5	-0.08	-0.01
Paraguay	4	4	1.01	0.51	0.5	0.5	-0.30	-0.55
Peru	39	39	-0.54	0.10	1.1	0.9	-1.81	-0.91
EUROPE	1 317	1 334	-0.56	0.07	1.6	1.6	-0.73	0.14
European Union[1]	707	723	-1.39	0.07	1.4	1.4	-1.53	0.15
United Kingdom	302	305	0.23	0.05	4.0	3.8	-0.45	-0.33
Russia	214	215	1.15	0.18	1.3	1.3	0.95	0.35
Ukraine	14	14	-5.44	0.16	0.3	0.3	-4.96	0.72
AFRICA	3 059	3 653	1.10	1.76	2.1	2.0	-1.45	-0.57
Egypt	125	142	-0.43	1.19	1.1	1.1	-2.48	-0.34
Ethiopia	57	71	-13.29	1.86	0.5	0.5	-15.46	-0.32
Nigeria	396	473	-0.12	1.80	1.8	1.6	-2.71	-0.70
South Africa	172	186	0.00	0.81	2.6	2.6	-1.32	-0.14
ASIA	9 854	11 430	2.66	1.21	1.9	2.0	1.63	0.50
China[2]	5 075	6 014	3.20	1.21	3.1	3.6	2.67	1.02
India	713	789	-0.73	1.01	0.5	0.5	-1.89	0.09
Indonesia	130	148	1.92	1.27	0.4	0.4	0.73	0.43
Iran	388	399	0.36	0.03	4.2	4.0	-0.82	-0.60
Japan	24	19	-2.87	-1.87	0.2	0.1	-2.73	-1.42
Kazakhstan	171	200	2.06	1.46	8.2	8.7	0.62	0.66
Korea	19	19	17.30	0.09	0.3	0.3	16.85	0.11
Malaysia	41	53	7.64	3.09	1.1	1.3	5.93	1.91
Pakistan	469	536	1.25	1.28	2.1	2.0	-0.78	-0.34
Philippines	62	77	1.37	2.26	0.5	0.5	-0.23	0.89
Saudi Arabia	171	183	0.18	0.62	4.5	4.1	-2.25	-0.69
Thailand	3	4	3.97	2.22	0.0	0.1	3.62	2.18
Turkey	401	415	4.45	0.34	4.3	4.2	2.84	-0.17
Viet Nam	18	24	10.21	3.02	0.2	0.2	9.02	2.21
OCEANIA	242	227	-1.67	0.73	5.3	4.3	-3.14	-0.43
Australia	197	184	-1.52	0.81	7.0	5.8	-2.91	-0.20
New Zealand	24	17	-3.17	-1.17	4.4	2.9	-4.14	-1.87
DEVELOPED COUNTRIES	**2 734**	**2 863**	**0.75**	**0.58**	**1.7**	**1.7**	**0.32**	**0.37**
DEVELOPING COUNTRIES	**12 346**	**14 406**	**2.12**	**1.32**	**1.8**	**1.8**	**0.77**	**0.23**
LEAST DEVELOPED COUNTRIES (LDC)	2 046	2 484	2.73	1.94	2.1	2.0	0.35	-0.28
OECD[3]	**2 042**	**2 056**	**0.45**	**0.24**	**1.3**	**1.3**	**-0.11**	**-0.05**
BRICS	**6 298**	**7 334**	**2.47**	**1.13**	**1.7**	**1.9**	**1.64**	**0.60**

Note: Calendar year; except year ending 30 September for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.30. Main policy assumptions for meat markets

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Beef export tax[1]	%	5.6	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
CANADA												
Beef tariff-quota	kt pw	129.2	129.2	129.2	129.2	129.2	129.2	129.2	129.2	129.2	129.2	129.2
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Poultry meat tariff-quota	kt pw	95.8	101.8	102.4	104.0	105.6	106.7	108.1	109.4	110.6	112.0	113.3
In-quota tariff	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Out-of-quota tariff	%	249.0	249.0	249.0	249.0	249.0	249.0	249.0	249.0	249.0	249.0	249.0
EUROPEAN UNION[2,3]												
Voluntary coupled support												
Beef and veal[4]	mln EUR	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693
Sheep and goat meat[5]	mln EUR	487	496	496	496	496	496	496	496	496	496	496
Beef basic price[6]	EUR/kg dwt	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Beef buy-in price[6,7]	EUR/kg dwt	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Beef tariff-quota	kt cwe	350.6	369.0	378.3	387.5	389.0	390.6	392.2	392.7	393.2	393.7	394.2
Pig tariff-quota	kt cwe	190.1	216.9	230.3	245.7	246.6	247.5	248.4	249.3	250.2	251.1	252.0
Poultry tariff-quota	kt rtc	1 014.7	1 021.1	1 024.3	1 026.3	1 028.4	1 030.5	1 032.5	1 034.6	1 036.7	1 038.7	1 040.8
Sheep meat tariff-quota	kt cwe	295.6	296.3	296.5	296.7	296.9	297.1	297.1	297.5	297.7	297.9	298.1
JAPAN[8]												
Beef stabilisation prices												
Upper price	JPY/kg dwt	1 241.7	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0	1 255.0
Lower price	JPY/kg dwt	916.7	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0
Beef tariff	%	35.8	26.9	26.0	25.2	24.4	23.6	22.7	21.9	21.1	20.2	18.6
Pigmeat stabilisation prices												
Upper price	JPY/kg dwt	595.0	595.0	595.0	595.0	595.0	595.0	595.0	595.0	595.0	595.0	595.0
Lower price	JPY/kg dwt	440.0	440.0	440.0	440.0	440.0	440.0	440.0	440.0	440.0	440.0	440.0
Pig meat import system												
Tariff	%	3.8	2.0	1.8	1.5	1.3	1.0	0.8	0.5	0.3	0.1	0.0
Standard import price	JPY/kg dwt	380.1	311.2	309.9	306.4	260.5	238.1	227.8	218.5	209.1	200.4	194.6
Poultry meat tariff	%	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
KOREA												
Beef tariff	%	21.3	16.0	13.3	10.6	8.0	5.3	2.6	0.0	0.0	0.0	0.0
Pigmeat tariff	%	21.3	16.0	13.3	10.6	8.0	5.3	2.6	0.0	0.0	0.0	0.0
Poultry meat tariff	%	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
MEXICO[9]												
Beef and veal tariff-quota	kt pw	220.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff[10]	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Poultry meat tariff-quota	kt pw	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
RUSSIA												
Beef tariff-quota	kt pw	570.0	570.0	570.0	570.0	570.0	570.0	570.0	570.0	570.0	570.0	570.0
In-quota tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Out-of-quota tariff	%	58.3	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Pigmeat tariff-quota[11]	kt pw	430.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	0.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Out-of-quota tariff	%	65.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Poultry tariff-quota	kt pw	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0
In-quota tariff	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Out-of-quota tariff	%	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
UNITED STATES												
Beef tariff-quota	kt pw	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6
In-quota tariff	%	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Out-of-quota tariff	%	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4

Table C.30. Main policy assumptions for meat markets *(cont.)*

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CHINA												
Beef tariff	%	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
Pigmeat tariff	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Sheep meat tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Poultry meat tariff	%	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1
INDIA												
Beef tariff	%	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
Pigmeat tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Sheep meat tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Poultry meat tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
SOUTH AFRICA												
Sheep meat tariff-quota	kt pw	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

Note: Average 2017-19est: Data for 2019 are estimated.

1. In Argentina, a temporary export tax is applied on all goods from September 4th 2018 until December 31st 2020.
2. Since 2015 the Basic payment scheme (BPS) holds, which shall account for the maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment and young farmer scheme.More details can be found in here: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/voluntary-coupled-support-note-revised-aug2018_en.pdf
3. Refers to all current European Union member States (excludes the United Kingdom)
4. Implemented in 24 Member States.
5. Implemented in 22 Member States.
6. Price for R3 grade male cattle.
7. Safety-net trigger.
8. Year beginning 1 April.
9. Intended for countries which whom Mexico has no free trade agreements.
10. 25% for frozen beef.
11. Eliminated in 2020 and replaced by import tariff.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.31.1. Butter projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**11 310**	**13 584**	**2.26**	**1.62**	**997**	**1 179**	**0.98**	**1.13**	**1 050**	**1 179**	**1.25**	**1.13**
NORTH AMERICA	965	1 023	1.45	0.50	56	50	18.38	-2.85	31	37	-11.13	6.17
Canada	112	131	3.41	1.73	18	25	16.83	1.02	0	0	-14.56	..
United States	853	892	1.22	0.33	38	25	19.27	-5.62	31	37	-11.06	6.19
LATIN AMERICA	437	497	2.43	1.16	63	85	4.80	3.18	37	40	-2.17	1.80
Argentina	28	34	-8.24	1.02	0	0	..	..	10	6	-4.74	2.09
Brazil	103	109	3.93	0.44	3	8	9.65	10.72	0	1	-27.13	8.88
Chile	25	25	2.11	-0.23	8	16	30.83	5.90	2	1	-5.03	-5.51
Colombia	21	23	0.04	1.24	0	0	..	..	1	3	..	15.29
Mexico	200	235	4.88	1.43	31	38	5.42	2.37	8	12	25.25	1.66
Paraguay	1	3	7.80	12.37	0	0	..	..	0	2	..	14.56
Peru	4	5	4.53	3.78	8	10	6.26	2.30	0	0	..	..
EUROPE	3 053	3 276	1.98	0.67	242	242	-3.26	-0.49	425	541	3.78	2.67
European Union[1]	2 292	2 515	2.21	0.82	45	52	-1.24	0.04	248	362	2.24	3.77
United Kingdom	149	143	1.72	0.27	99	111	-0.18	-0.05	55	55	7.74	0.05
Russia	311	313	0.74	-0.01	89	71	-6.50	-1.36	3	2	-2.84	0.00
Ukraine	105	90	3.37	-0.92	1	1	-25.95	-0.16	28	11	50.56	-4.88
AFRICA	292	348	-0.79	1.97	97	145	-5.28	2.66	6	5	-5.62	-0.37
Egypt	101	116	-2.87	1.77	30	61	-7.87	4.94	1	1	-18.71	-0.90
Ethiopia	17	22	-0.80	2.64	0	0	..	..	0	0	..	..
Nigeria	12	16	-0.55	3.61	10	15	-9.45	1.51	0	0	..	..
South Africa	22	29	2.83	2.76	7	7	12.78	-0.25	3	3	12.52	0.25
ASIA	5 984	7 842	2.93	2.32	498	609	3.41	1.68	71	46	7.42	-7.03
China[2]	106	115	0.01	0.48	106	142	17.61	2.07	2	2	-4.68	1.00
India	4 363	5 681	3.24	2.25	1	1	-19.06	1.54	33	9	17.40	-17.71
Indonesia	0	0	..	..	24	32	6.52	3.06	0	0	..	..
Iran	143	142	-3.07	-0.03	36	57	-4.41	3.86	1	1	5.11	-0.46
Japan	56	51	-2.49	-0.76	12	12	7.68	1.54	0	0	..	..
Kazakhstan	21	29	5.91	4.00	6	3	-0.84	-4.81	1	2	79.84	4.28
Korea	2	3	2.27	0.36	11	19	7.19	3.05	0	0	..	..
Malaysia	0	0	..	..	20	24	6.17	1.29	7	7	8.34	-1.28
Pakistan	823	1 135	2.97	2.93	0	0	..	..	0	0	..	..
Philippines	0	0	..	..	34	59	7.41	4.14	0	0	..	..
Saudi Arabia	5	5	-2.61	-0.38	48	55	-1.25	2.29	6	5	8.30	-2.24
Thailand	0	0	..	..	13	14	2.56	-0.04	1	1	11.81	0.04
Turkey	274	419	6.53	3.00	10	1	-3.40	-19.63	1	1	7.88	2.96
Viet Nam	0	0	..	..	15	25	-0.59	4.15	0	0	..	..
OCEANIA	578	599	0.29	0.59	40	48	6.99	0.67	482	509	0.07	0.42
Australia	84	73	-5.87	0.98	36	44	8.67	0.63	20	12	-14.28	-2.95
New Zealand	492	523	1.60	0.54	1	1	4.10	1.00	462	497	1.40	0.53
DEVELOPED COUNTRIES	**4 736**	**5 070**	**1.60**	**0.67**	**387**	**380**	**0.20**	**-0.76**	**945**	**1 097**	**1.14**	**1.65**
DEVELOPING COUNTRIES	**6 574**	**8 513**	**2.76**	**2.24**	**610**	**800**	**1.49**	**2.17**	**106**	**83**	**2.03**	**-4.07**
LEAST DEVELOPED COUNTRIES (LDC)	185	238	-0.22	2.74	17	22	2.56	2.05	2	1	-1.90	-0.85
OECD[3]	**4 624**	**5 098**	**1.96**	**0.87**	**311**	**344**	**3.84**	**-0.10**	**831**	**986**	**0.52**	**1.73**
BRICS	**4 904**	**6 248**	**3.00**	**2.05**	**207**	**230**	**1.08**	**0.99**	**40**	**17**	**10.39**	**-12.84**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.31.2. Butter projections: Consumption, food

Calendar year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**11 254**	**13 581**	**2.22**	**1.60**	**1.5**	**1.6**	**1.04**	**0.66**
NORTH AMERICA	984	1 035	2.43	0.15	2.7	2.7	1.69	-0.42
Canada	125	156	4.07	1.56	3.4	3.9	3.03	0.75
United States	859	879	2.21	-0.08	2.6	2.5	1.50	-0.63
LATIN AMERICA	468	542	3.64	1.40	0.7	0.8	2.55	0.62
Argentina	22	27	-3.91	0.78	0.5	0.6	-4.87	-0.05
Brazil	106	116	4.44	0.87	0.5	0.5	3.57	0.34
Chile	30	40	6.41	2.10	1.7	2.0	5.51	1.46
Colombia	20	19	-0.28	0.06	0.4	0.4	-1.19	-0.52
Mexico	223	260	4.52	1.55	1.8	1.9	3.23	0.64
Paraguay	0	0	..	..	0.0	0.1	-1.55	2.08
Peru	12	15	5.68	2.79	0.4	0.4	4.34	1.75
EUROPE	2 864	2 977	1.03	0.21	3.8	4.0	0.87	0.29
European Union[1]	2 086	2 205	1.98	0.35	4.7	5.0	1.84	0.42
United Kingdom	188	198	-0.95	0.15	2.8	2.8	-1.62	-0.23
Russia	397	383	-1.51	-0.27	2.7	2.7	-1.70	-0.10
Ukraine	78	80	-1.53	-0.23	1.8	1.9	-1.03	0.32
AFRICA	384	488	-2.05	2.20	0.3	0.3	-4.52	-0.14
Egypt	130	176	-4.21	2.78	1.3	1.5	-6.18	1.23
Ethiopia	17	22	-0.80	2.66	0.2	0.2	-3.28	0.47
Nigeria	21	32	-5.58	2.53	0.1	0.1	-8.03	0.01
South Africa	26	34	4.03	2.23	0.5	0.5	2.66	1.27
ASIA	6 411	8 402	2.90	2.35	1.4	1.7	1.87	1.64
China[2]	210	255	6.10	1.33	0.1	0.2	5.55	1.14
India	4 331	5 673	3.14	2.35	3.2	3.8	1.93	1.42
Indonesia	23	32	7.20	3.10	0.1	0.1	5.95	2.24
Iran	179	198	-3.33	0.94	2.2	2.2	-4.46	0.31
Japan	69	64	-2.36	-0.66	0.5	0.5	-2.22	-0.21
Kazakhstan	25	30	3.28	2.55	1.4	1.5	1.82	1.74
Korea	13	18	4.29	3.29	0.2	0.4	3.89	3.30
Malaysia	13	18	5.28	2.43	0.4	0.5	3.61	1.25
Pakistan	822	1 135	2.98	2.93	4.1	4.7	0.91	1.29
Philippines	34	59	7.35	4.17	0.3	0.5	5.66	2.77
Saudi Arabia	47	55	-2.23	2.56	1.4	1.4	-4.60	1.22
Thailand	12	13	2.01	-0.04	0.2	0.2	1.65	-0.08
Turkey	284	420	5.99	2.68	3.5	4.8	4.36	2.17
Viet Nam	15	25	-0.60	4.16	0.2	0.2	-1.66	3.34
OCEANIA	143	137	6.50	0.18	3.5	3.0	4.91	-0.97
Australia	107	105	7.14	-0.01	4.3	3.8	5.62	-1.01
New Zealand	31	27	10.10	0.74	6.6	5.2	9.00	0.03
DEVELOPED COUNTRIES	**4 173**	**4 354**	**1.48**	**0.25**	**2.9**	**3.0**	**1.05**	**0.04**
DEVELOPING COUNTRIES	**7 081**	**9 227**	**2.67**	**2.31**	**1.1**	**1.3**	**1.32**	**1.20**
LEAST DEVELOPED COUNTRIES (LDC)	200	258	0.02	2.70	0.2	0.2	-2.30	0.47
OECD[3]	**4 099**	**4 454**	**2.34**	**0.56**	**3.0**	**3.1**	**1.77**	**0.26**
BRICS	**5 070**	**6 460**	**2.84**	**2.10**	**1.6**	**1.9**	**2.01**	**1.57**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.32.1. Cheese projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**23 579**	**26 829**	**1.53**	**1.18**	**3 116**	**3 696**	**2.81**	**1.42**	**3 195**	**3 696**	**1.59**	**1.42**
NORTH AMERICA	6 340	7 498	2.73	1.50	169	182	0.10	0.80	358	464	6.18	2.24
Canada	483	561	3.25	1.65	31	55	4.96	2.30	12	13	3.03	0.32
United States	5 857	6 937	2.68	1.49	138	128	-0.80	0.23	346	451	6.31	2.30
LATIN AMERICA	2 143	2 580	-0.23	1.70	350	445	4.78	2.38	156	142	0.38	-0.87
Argentina	429	511	-3.52	1.63	2	1	-11.46	0.00	56	59	0.74	-0.51
Brazil	765	969	1.77	1.97	28	30	0.35	1.99	3	5	-0.64	4.78
Chile	98	100	3.14	0.25	48	76	22.23	4.30	9	6	-2.89	-4.10
Colombia	59	62	-0.01	0.58	4	2	23.50	-4.31	1	1	-10.04	0.63
Mexico	331	383	2.45	1.24	123	160	5.95	2.79	2	4	29.66	7.89
Paraguay	0	0	..	..	5	7	16.34	2.16	0	0	..	..
Peru	25	34	3.25	3.07	7	8	12.04	0.70	0	0	..	..
EUROPE	11 927	13 040	1.68	0.79	1 049	1 131	0.17	0.22	1 793	2 209	2.43	1.91
European Union[1]	10 238	11 046	1.69	0.70	195	206	1.76	0.47	1 279	1 613	2.20	2.24
United Kingdom	475	556	3.03	0.97	513	522	2.44	-0.02	180	180	6.02	0.04
Russia	491	619	1.90	2.15	207	243	-6.56	0.06	15	11	-0.44	-2.15
Ukraine	134	138	-5.91	0.47	15	37	-0.21	5.14	8	4	-27.76	-5.06
AFRICA	876	1 069	-1.81	2.23	138	194	-2.53	3.02	127	91	-5.20	-1.49
Egypt	520	616	-2.76	2.09	24	37	-4.70	1.86	101	66	-6.02	-1.83
Ethiopia	6	7	0.14	1.92	0	1	..	12.67	0	0	..	..
Nigeria	9	9	-0.71	-0.15	1	3	-19.93	12.96	0	0	..	..
South Africa	100	128	2.73	2.13	11	8	5.34	-0.60	10	12	23.47	0.60
ASIA	1 547	1 860	0.35	1.76	1 292	1 629	5.99	2.03	255	284	-3.63	1.00
China[2]	269	297	-0.07	0.52	109	150	20.51	3.11	0	0	..	..
India	4	3	12.20	-2.08	3	4	13.51	0.60	7	7	15.09	-0.60
Indonesia	0	0	..	..	30	40	7.41	2.56	1	1	10.02	-2.50
Iran	209	228	-3.26	0.92	0	0	..	..	59	51	13.53	-1.96
Japan	45	45	-0.23	-0.05	290	382	4.51	1.69	0	0	..	..
Kazakhstan	25	28	4.26	1.26	18	25	-2.36	3.29	2	1	32.14	-3.01
Korea	30	29	2.39	0.33	126	164	8.49	2.37	0	0	..	..
Malaysia	0	0	..	..	26	35	10.59	2.74	1	0	11.75	..
Pakistan	0	0	..	..	5	8	22.12	3.90	0	0	..	..
Philippines	0	0	..	..	37	52	12.19	3.03	0	0	-20.12	..
Saudi Arabia	171	216	0.27	2.19	173	195	5.01	1.28	76	72	-13.25	-1.27
Thailand	5	4	0.00	-1.38	17	23	12.52	2.30	0	0	..	..
Turkey	220	290	3.09	2.91	9	4	5.61	-6.93	50	105	7.11	7.44
Viet Nam	0	0	..	..	9	13	9.67	3.59	0	0	..	..
OCEANIA	745	783	2.11	0.42	118	114	5.43	0.60	506	507	2.16	0.21
Australia	369	397	1.05	0.52	106	101	4.97	0.65	168	160	0.24	0.02
New Zealand	376	386	3.24	0.31	11	11	10.81	0.00	338	347	3.24	0.30
DEVELOPED COUNTRIES	**19 459**	**21 868**	**2.03**	**1.04**	**1 683**	**1 872**	**1.26**	**0.61**	**2 677**	**3 202**	**2.86**	**1.67**
DEVELOPING COUNTRIES	**4 121**	**4 961**	**-0.60**	**1.82**	**1 433**	**1 824**	**4.90**	**2.32**	**518**	**495**	**-3.44**	**-0.08**
LEAST DEVELOPED COUNTRIES (LDC)	295	392	-0.84	2.97	29	52	4.19	5.28	0	0	..	..
OECD[3]	**19 001**	**21 222**	**2.08**	**1.00**	**1 682**	**1 920**	**3.72**	**1.11**	**2 466**	**2 968**	**2.95**	**1.81**
BRICS	**1 629**	**2 016**	**1.58**	**1.80**	**359**	**436**	**-1.47**	**1.14**	**36**	**35**	**5.73**	**-0.08**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.32.2. Cheese projections: Consumption, food

Calendar year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**23 566**	**26 828**	**1.74**	**1.18**	**3.1**	**3.2**	**0.57**	**0.24**
NORTH AMERICA	6 217	7 215	2.64	1.44	17.1	18.6	1.90	0.86
Canada	503	602	3.40	1.74	13.6	14.9	2.36	0.93
United States	5 714	6 613	2.58	1.41	17.5	19.0	1.86	0.85
LATIN AMERICA	2 337	2 883	0.36	1.95	3.6	4.1	-0.69	1.16
Argentina	375	453	-4.12	1.94	8.4	9.3	-5.08	1.10
Brazil	790	994	1.73	1.95	3.8	4.5	0.88	1.41
Chile	138	169	7.90	2.10	7.6	8.7	6.99	1.46
Colombia	63	64	0.94	0.35	1.3	1.2	0.03	-0.23
Mexico	452	539	3.26	1.64	3.6	3.9	1.99	0.73
Paraguay	5	6	18.14	2.33	0.7	0.8	16.61	1.25
Peru	31	42	4.59	2.60	1.0	1.1	3.26	1.57
EUROPE	11 183	11 962	1.42	0.54	15.0	16.1	1.26	0.62
European Union[1]	9 154	9 639	1.63	0.46	20.6	21.8	1.49	0.53
United Kingdom	808	898	2.09	0.57	12.0	12.8	1.40	0.20
Russia	683	851	-1.12	1.57	4.7	5.9	-1.32	1.75
Ukraine	140	171	-0.23	1.50	3.2	4.1	0.27	2.07
AFRICA	887	1 172	-1.35	2.72	0.7	0.7	-3.83	0.36
Egypt	443	587	-1.99	2.62	4.5	5.0	-4.00	1.07
Ethiopia	6	8	0.28	2.79	0.1	0.1	-2.22	0.60
Nigeria	10	12	-10.30	1.64	0.1	0.0	-12.63	-0.86
South Africa	100	124	1.92	2.09	1.8	1.9	0.57	1.12
ASIA	2 585	3 205	3.44	1.97	0.6	0.7	2.40	1.25
China[2]	378	447	3.30	1.32	0.3	0.3	2.77	1.13
India	0	0	..	..	0.0	0.0	-66.95	0.14
Indonesia	29	39	7.24	2.74	0.1	0.1	5.99	1.88
Iran	149	177	-6.53	1.94	1.8	2.0	-7.62	1.30
Japan	335	427	3.76	1.50	2.6	3.5	3.91	1.96
Kazakhstan	41	52	0.50	2.35	2.2	2.6	-0.92	1.54
Korea	156	193	7.04	2.04	3.0	3.8	6.63	2.06
Malaysia	25	34	10.53	2.82	0.8	0.9	8.77	1.64
Pakistan	5	8	22.13	3.90	0.0	0.0	19.68	2.25
Philippines	37	51	13.13	3.05	0.3	0.4	11.35	1.67
Saudi Arabia	268	338	20.04	2.53	8.0	8.7	17.13	1.20
Thailand	21	27	8.39	1.75	0.3	0.4	8.02	1.71
Turkey	179	189	2.26	0.76	2.2	2.2	0.69	0.25
Viet Nam	9	13	9.15	3.78	0.1	0.1	7.98	2.95
OCEANIA	357	390	3.73	0.75	8.8	8.5	2.18	-0.41
Australia	307	338	3.59	0.81	12.3	12.1	2.12	-0.20
New Zealand	49	50	4.59	0.34	10.3	9.7	3.54	-0.37
DEVELOPED COUNTRIES	**18 529**	**20 538**	**1.91**	**0.91**	**13.0**	**14.1**	**1.48**	**0.70**
DEVELOPING COUNTRIES	**5 036**	**6 290**	**1.12**	**2.13**	**0.8**	**0.9**	**-0.22**	**1.02**
LEAST DEVELOPED COUNTRIES (LDC)	323	443	-0.53	3.22	0.4	0.4	-2.83	0.97
OECD[3]	**18 282**	**20 174**	**2.18**	**0.89**	**13.2**	**14.1**	**1.60**	**0.60**
BRICS	**1 952**	**2 417**	**0.91**	**1.70**	**0.6**	**0.7**	**0.09**	**1.17**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.33.1. Skim milk powder projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**4 359**	**5 184**	**3.15**	**1.62**	**2 672**	**3 265**	**5.68**	**2.00**	**2 692**	**3 265**	**5.86**	**2.00**
NORTH AMERICA	1 170	1 542	2.74	2.53	4	5	0.62	0.00	709	1 053	6.95	3.88
Canada	105	119	4.32	1.44	2	3	-5.25	0.00	61	56	29.50	0.93
United States	1 065	1 423	2.59	2.63	2	2	21.31	0.00	649	997	6.03	4.07
LATIN AMERICA	296	349	2.16	1.69	505	537	7.76	1.27	143	153	14.20	0.32
Argentina	43	43	2.34	0.93	0	0	..	..	22	25	2.36	1.85
Brazil	157	191	2.14	1.68	27	20	2.27	0.00	0	0	..	..
Chile	7	8	-7.60	0.86	14	21	14.37	4.22	1	0	-10.06	-4.05
Colombia	0	0	..	..	18	28	35.08	0.58	0	0	..	..
Mexico	45	44	4.76	0.05	326	390	7.37	1.39	101	104	45.14	0.00
Paraguay	0	0	..	..	1	1	..	0.08	0	0	..	..
Peru	0	0	..	..	24	27	4.82	2.56	0	0	..	..
EUROPE	1 871	2 242	5.21	1.55	228	211	7.86	-0.35	1 101	1 329	8.05	2.01
European Union[1]	1 473	1 774	6.18	1.60	53	50	14.83	-0.97	864	1 032	8.74	2.00
United Kingdom	79	102	1.64	3.06	44	34	-0.67	-0.16	72	88	2.92	4.37
Russia	77	81	2.74	0.98	96	93	8.51	-0.03	1	1	28.54	0.00
Ukraine	88	86	-2.63	0.09	1	1	-17.32	0.22	25	24	5.34	-0.09
AFRICA	9	12	0.89	1.69	401	521	4.44	3.17	15	11	6.70	-1.33
Egypt	0	0	..	..	68	100	2.14	3.88	0	0	-24.67	..
Ethiopia	0	0	..	..	0	0	..	..	0	0	..	..
Nigeria	0	0	..	..	33	52	2.92	3.87	0	0	..	..
South Africa	5	7	1.68	0.38	10	8	8.64	-0.15	8	7	13.57	0.15
ASIA	381	435	1.41	0.97	1 518	1 971	5.16	2.22	142	145	4.13	-0.90
China[2]	20	21	0.00	0.55	269	350	10.69	2.18	1	1	21.10	0.00
India	231	285	5.15	1.38	1	0	-39.95	..	34	52	8.96	-1.36
Indonesia	0	0	..	..	168	255	3.45	2.67	1	1	3.41	-2.60
Iran	0	0	..	..	20	6	0.74	0.00	20	6	12.99	0.00
Japan	112	107	-3.45	0.00	55	46	7.94	-1.97	0	0	..	..
Kazakhstan	2	3	-0.34	0.25	21	22	1.06	2.62	0	0	..	..
Korea	10	12	2.58	1.24	24	27	5.96	0.38	0	0	..	..
Malaysia	0	0	..	..	126	167	4.43	2.73	9	4	-2.92	-2.66
Pakistan	0	0	..	..	38	47	7.90	3.87	0	0	1.68	..
Philippines	0	0	..	..	169	235	7.11	2.05	0	0	..	..
Saudi Arabia	0	0	..	..	44	50	-2.74	2.39	10	6	-14.11	-2.34
Thailand	0	0	..	..	67	68	1.24	-0.13	12	14	32.00	0.13
Turkey	0	0	..	..	34	45	37.89	0.00	34	45	65.00	0.00
Viet Nam	0	0	..	..	90	137	0.61	3.75	1	0	-8.01	..
OCEANIA	633	604	0.21	0.18	15	20	6.73	0.87	583	573	1.02	0.40
Australia	197	125	-0.84	-3.91	10	13	12.77	0.00	154	101	1.86	-3.90
New Zealand	436	478	0.75	1.61	0	0	-25.84	..	429	472	0.75	1.63
DEVELOPED COUNTRIES	**3 799**	**4 511**	**3.14**	**1.63**	**355**	**341**	**7.30**	**-0.16**	**2 404**	**2 965**	**5.64**	**2.27**
DEVELOPING COUNTRIES	**560**	**673**	**3.18**	**1.53**	**2 317**	**2 924**	**5.48**	**2.29**	**288**	**300**	**8.13**	**-0.34**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	154	233	8.62	4.01	5	3	7.28	-3.21
OECD[3]	**3 564**	**4 229**	**3.14**	**1.66**	**615**	**692**	**8.44**	**0.67**	**2 382**	**2 914**	**6.22**	**2.22**
BRICS	**490**	**585**	**3.44**	**1.38**	**402**	**471**	**7.50**	**1.56**	**44**	**61**	**8.90**	**-1.15**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.33.2. Skim milk powder projections: Consumption, food

Calendar year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**4 511**	**5 184**	**3.17**	**1.58**	**0.6**	**0.6**	**2.01**	**0.73**
NORTH AMERICA	475	494	-1.63	0.14	1.2	1.2	-2.48	-0.59
Canada	57	65	-3.20	1.84	0.7	0.8	-7.24	0.28
United States	418	429	-1.42	-0.10	1.3	1.2	-2.10	-0.65
LATIN AMERICA	659	733	4.09	1.68	0.9	1.0	3.15	0.91
Argentina	21	18	0.63	-0.24	0.5	0.4	-0.39	-1.06
Brazil	184	211	2.09	1.51	0.6	0.7	1.04	0.95
Chile	21	29	3.58	3.31	1.1	1.5	2.71	2.67
Colombia	18	28	37.89	0.58	0.4	0.5	36.64	0.00
Mexico	270	331	3.03	1.67	2.1	2.4	1.75	0.76
Paraguay	0	0	..	..	0.0	0.0	-11.29	-0.70
Peru	24	27	4.83	2.56	0.7	0.7	3.50	1.53
EUROPE	1 144	1 124	3.21	0.51	1.4	1.4	2.98	0.86
European Union[1]	796	792	3.78	0.69	1.5	1.6	3.63	1.21
United Kingdom	59	48	-0.26	-0.99	0.9	0.7	-0.94	-1.36
Russia	177	173	5.53	0.43	1.2	1.2	5.33	0.60
Ukraine	64	63	-4.87	0.16	1.4	1.5	-4.40	0.72
AFRICA	396	522	4.28	3.26	0.3	0.3	1.65	0.89
Egypt	68	100	2.36	3.89	0.7	0.8	0.26	2.33
Ethiopia	0	0	..	..	0.0	0.0	-9.76	0.00
Nigeria	33	52	2.93	3.89	0.2	0.2	0.25	1.34
South Africa	7	8	14.96	0.06	0.1	0.1	13.44	-0.89
ASIA	1 760	2 261	4.37	2.20	0.4	0.5	3.36	1.52
China[2]	289	370	9.44	2.08	0.2	0.3	8.88	1.89
India	197	234	4.43	2.08	0.1	0.2	3.21	1.15
Indonesia	167	254	3.45	2.70	0.6	0.9	2.24	1.84
Iran	0	0	-77.59	..	0.0	0.0	-77.86	-0.06
Japan	169	154	-0.87	-0.64	1.1	1.1	-1.33	-0.22
Kazakhstan	23	25	1.18	2.35	1.3	1.2	-0.25	1.55
Korea	35	39	4.47	0.63	0.7	0.8	4.07	0.64
Malaysia	117	163	4.90	2.89	3.6	4.5	3.24	1.70
Pakistan	38	47	8.08	3.91	0.2	0.2	5.91	2.25
Philippines	169	235	7.11	2.05	1.6	1.9	5.42	0.68
Saudi Arabia	34	44	6.45	3.21	1.0	1.1	3.87	1.87
Thailand	55	54	-1.10	-0.20	0.8	0.8	-1.44	-0.24
Turkey	0	0	-44.55	..	0.0	0.0	-45.41	-0.05
Viet Nam	90	137	0.69	3.77	0.9	1.3	-0.39	2.94
OCEANIA	77	50	-0.14	-1.79	1.9	1.1	-1.63	-2.92
Australia	66	37	-0.14	-2.72	2.6	1.3	-1.56	-3.69
New Zealand	7	7	-4.58	0.22	1.5	1.3	-5.54	-0.49
DEVELOPED COUNTRIES	**1 920**	**1 888**	**1.35**	**0.29**	**1.2**	**1.2**	**0.77**	**0.21**
DEVELOPING COUNTRIES	**2 591**	**3 296**	**4.73**	**2.40**	**0.4**	**0.5**	**3.40**	**1.31**
LEAST DEVELOPED COUNTRIES (LDC)	149	230	8.66	4.15	0.2	0.2	6.14	1.89
OECD[3]	**1 965**	**2 008**	**1.58**	**0.49**	**1.3**	**1.3**	**0.88**	**0.33**
BRICS	**854**	**996**	**5.17**	**1.64**	**0.3**	**0.3**	**4.52**	**1.11**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.34.1. Whole milk powder projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**5 033**	**5 894**	**1.53**	**1.69**	**2 637**	**2 929**	**2.40**	**1.01**	**2 563**	**2 929**	**2.20**	**1.01**
NORTH AMERICA	57	92	4.76	3.94	10	11	1.18	0.36	25	57	11.91	9.99
Canada	8	7	-3.89	-1.83	3	4	-3.68	1.11	1	1	6.26	1.11
United States	49	85	7.21	4.61	7	7	3.56	0.00	24	56	12.13	10.18
LATIN AMERICA	1 317	1 756	0.53	2.37	270	207	-2.50	-1.31	273	379	-0.13	2.05
Argentina	175	202	-5.89	1.00	0	0	-42.47	..	100	141	-6.93	2.23
Brazil	592	851	1.87	3.03	65	48	4.89	-1.15	2	11	-4.79	26.44
Chile	77	85	-2.55	0.74	8	4	13.39	0.61	4	5	-13.84	-0.56
Colombia	42	59	-0.01	3.86	13	7	36.26	-6.15	2	3	-1.15	5.83
Mexico	223	259	0.84	1.27	43	42	13.23	-0.73	6	1	-5.45	-18.33
Paraguay	0	0	..	..	3	5	10.48	0.00	3	5	63.31	0.00
Peru	0	0	..	..	20	20	8.27	2.04	0	0	..	..
EUROPE	889	1 052	0.99	2.11	83	86	2.52	-0.85	427	529	-1.75	3.33
European Union[1]	706	816	1.11	2.05	20	23	-4.24	0.00	350	421	-2.39	3.20
United Kingdom	38	71	1.02	5.23	18	11	-3.52	-4.44	42	68	5.75	4.25
Russia	58	57	-0.63	0.16	41	49	17.99	-0.22	2	2	35.40	0.00
Ukraine	12	18	1.80	2.25	0	0	..	..	4	7	6.47	5.04
AFRICA	53	64	13.93	1.14	612	747	1.63	2.29	26	26	8.15	-0.72
Egypt	0	0	..	..	27	43	-5.50	2.44	10	8	35.94	-2.38
Ethiopia	0	0	..	..	1	2	9.14	2.18	0	0	..	..
Nigeria	0	0	..	..	86	123	-1.46	3.82	0	0	-9.82	..
South Africa	12	15	3.07	2.28	4	3	9.62	-1.96	6	9	10.45	1.99
ASIA	1 257	1 359	0.57	2.18	1 629	1 852	3.68	0.97	371	385	3.63	-0.44
China[2]	1 132	1 183	0.38	2.04	514	590	4.35	0.50	2	2	-12.54	0.35
India	7	9	120.33	2.82	0	0	-35.66	..	3	5	12.55	4.83
Indonesia	79	118	2.72	3.73	55	67	0.47	1.25	0	0	-39.07	..
Iran	1	1	-3.18	0.61	2	2	-2.96	0.30	2	1	4.06	0.00
Japan	10	13	-3.33	1.67	0	0	..	..	0	0	..	..
Kazakhstan	16	17	1.24	0.90	2	1	-12.11	-4.24	0	0	..	..
Korea	2	2	-1.12	0.68	5	6	11.83	0.50	0	0	..	..
Malaysia	0	0	..	..	57	63	11.63	0.15	40	44	17.48	-0.15
Pakistan	0	0	..	..	3	2	-9.45	1.32	0	0	-26.32	..
Philippines	0	0	..	..	23	30	-7.78	1.06	5	7	-20.99	-1.05
Saudi Arabia	0	0	..	..	122	139	3.48	2.00	17	13	-7.10	-1.96
Thailand	0	0	..	..	59	80	8.60	1.89	2	1	-14.53	-1.85
Turkey	0	0	..	..	1	1	-12.78	0.00	1	1	-5.01	0.00
Viet Nam	0	0	..	..	47	52	1.56	1.23	11	9	8.43	-1.21
OCEANIA	1 460	1 573	3.25	0.26	33	26	10.02	-2.11	1 440	1 553	3.57	0.28
Australia	63	57	-10.89	0.21	27	19	14.58	-2.96	49	43	-10.26	0.83
New Zealand	1 397	1 515	4.44	0.27	2	2	11.15	0.00	1 391	1 509	4.44	0.27
DEVELOPED COUNTRIES	**2 444**	**2 763**	**2.36**	**1.06**	**136**	**129**	**3.87**	**-1.09**	**1 899**	**2 149**	**2.25**	**1.14**
DEVELOPING COUNTRIES	**2 589**	**3 131**	**0.78**	**2.28**	**2 502**	**2 800**	**2.32**	**1.12**	**664**	**779**	**1.96**	**0.66**
LEAST DEVELOPED COUNTRIES (LDC)	34	38	41.99	0.38	230	305	1.76	2.85	8	6	-0.59	-1.60
OECD[3]	**2 630**	**2 984**	**2.08**	**1.09**	**153**	**132**	**5.06**	**-1.42**	**1 872**	**2 110**	**2.20**	**1.06**
BRICS	**1 800**	**2 114**	**0.93**	**2.38**	**623**	**690**	**4.82**	**0.31**	**15**	**28**	**1.01**	**5.90**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.34.2. Whole milk powder projections: Consumption, food

Calendar year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**5 089**	**5 894**	**1.61**	**1.67**	**0.7**	**0.7**	**0.45**	**0.73**
NORTH AMERICA	41	46	0.72	-1.27	0.1	0.1	-0.01	-1.84
Canada	11	10	-4.23	-1.09	0.3	0.2	-5.19	-1.87
United States	30	36	2.47	-1.33	0.1	0.1	1.76	-1.87
LATIN AMERICA	1 314	1 583	-0.04	1.88	2.0	2.2	-1.09	1.10
Argentina	76	60	-4.16	-1.41	1.7	1.2	-5.12	-2.22
Brazil	655	888	2.17	2.67	3.1	4.0	1.32	2.12
Chile	81	84	-0.41	0.81	4.4	4.3	-1.24	0.18
Colombia	52	62	2.66	2.11	1.1	1.2	1.73	1.52
Mexico	260	300	2.38	1.24	2.1	2.1	1.12	0.33
Paraguay	0	0	..	..	0.0	0.0	-58.50	-0.10
Peru	20	20	8.55	2.05	0.6	0.5	7.17	1.02
EUROPE	525	609	3.45	0.54	0.7	0.8	3.29	0.62
European Union[1]	356	418	4.34	0.64	0.8	0.9	4.19	0.72
United Kingdom	14	14	-11.61	-0.18	0.2	0.2	-12.21	-0.55
Russia	97	104	3.84	-0.02	0.7	0.7	3.64	0.16
Ukraine	8	11	1.29	0.69	0.2	0.3	1.80	1.25
AFRICA	639	785	2.08	2.30	0.5	0.5	-0.49	-0.04
Egypt	17	35	-10.83	3.95	0.2	0.3	-12.66	2.38
Ethiopia	1	2	10.76	2.18	0.0	0.0	7.99	0.00
Nigeria	86	122	-1.37	3.84	0.4	0.5	-3.93	1.29
South Africa	10	9	1.90	0.94	0.2	0.1	0.56	-0.02
ASIA	2 514	2 826	2.09	1.75	0.6	0.6	1.07	1.04
China[2]	1 643	1 771	1.58	1.50	1.2	1.2	1.06	1.32
India	4	4	11.33	0.92	0.0	0.0	10.02	0.00
Indonesia	134	184	3.28	2.76	0.5	0.6	2.07	1.91
Iran	1	2	-10.52	0.63	0.0	0.0	-11.57	0.00
Japan	10	13	-3.13	1.64	0.1	0.1	-2.99	2.10
Kazakhstan	18	19	-1.55	0.48	1.0	0.9	-2.94	-0.32
Korea	7	7	5.88	0.56	0.1	0.1	5.47	0.57
Malaysia	17	19	3.97	0.85	0.5	0.5	2.31	-0.31
Pakistan	3	1	28.19	1.62	0.0	0.0	25.61	0.00
Philippines	18	23	4.83	1.85	0.2	0.2	3.18	0.48
Saudi Arabia	106	125	6.17	2.54	3.2	3.2	3.60	1.20
Thailand	57	78	10.69	1.97	0.8	1.1	10.31	1.93
Turkey	0	0	..	..	0.0	0.0	-40.77	-0.05
Viet Nam	37	44	0.88	1.80	0.4	0.4	-0.21	0.99
OCEANIA	56	46	-1.48	-1.70	1.4	1.0	-1.66	-2.82
Australia	45	33	-2.91	-2.50	1.8	1.2	-4.29	-3.47
New Zealand	7	8	5.23	0.47	1.5	1.5	154.99	-0.25
DEVELOPED COUNTRIES	**663**	**743**	**2.77**	**0.29**	**0.5**	**0.5**	**2.45**	**0.09**
DEVELOPING COUNTRIES	**4 427**	**5 151**	**1.43**	**1.88**	**0.7**	**0.7**	**0.09**	**0.78**
LEAST DEVELOPED COUNTRIES (LDC)	256	337	3.60	2.64	0.3	0.3	1.19	0.40
OECD[3]	**893**	**1 006**	**2.14**	**0.68**	**0.6**	**0.7**	**1.65**	**0.39**
BRICS	**2 409**	**2 776**	**1.82**	**1.80**	**0.8**	**0.8**	**1.00**	**1.27**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.35. Whey powder projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[1]		IMPORTS (kt)		Growth (%)		EXPORTS (kt)		Growth (%)	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**3 124**	**3 547**	**1.46**	**1.17**	**1 593.6**	**2 069.4**	**5.77**	**2.47**	**1 943.8**	**2 419.6**	**5.33**	**2.08**
NORTH AMERICA	498	567	-0.18	1.32	3.8	5.5	-1.87	1.90	241.0	294.1	1.91	1.92
Canada	39	46	7.30	1.65	3.8	5.5	-1.87	1.90	41.0	48.2	10.02	1.14
United States	459	521	-0.65	1.29	0.0	0.0	..	..	200.0	245.9	0.76	2.08
LATIN AMERICA	162	191	2.63	1.48	104.9	118.5	-0.18	1.58	158.2	189.1	6.02	1.57
Argentina	71	84	3.86	1.63	0.6	0.5	-28.84	0.00	50.3	57.2	-1.10	1.60
Brazil	0	0	..	..	15.6	11.5	-6.94	0.01	0.2	0.4	..	..
Chile	9	9	193.79	0.25	6.9	14.4	0.23	6.78	15.6	23.5	9.33	3.74
Colombia	0	0	..	..	13.7	16.6	14.01	2.15	0.0	0.0	-60.72	..
Mexico	56	65	0.26	1.24	38.9	38.0	1.21	-0.21	45.9	49.1	146.04	-0.05
Paraguay	0	0	..	..	1.0	1.2	..	2.27	0.0	0.0	..	..
Peru	0	0	..	..	10.2	13.7	5.20	2.65	10.2	13.7	5.20	2.65
EUROPE	2 187	2 484	1.62	1.15	255.3	244.7	8.20	-0.17	915.6	1 041.4	4.84	1.24
European Union[2]	1 846	2 094	0.81	1.17	66.8	49.5	3.40	-1.45	624.6	723.3	4.31	1.53
United Kingdom	79	93	-0.12	0.97	53.1	41.9	11.15	-2.02	54.7	49.0	-0.39	-0.98
Russia	1	1	0.06	2.20	116.6	141.8	14.07	1.51	3.1	3.2	55.68	0.00
Ukraine	42	44	11.63	0.47	1.3	0.6	-4.17	-8.36	31.1	32.4	7.23	0.27
AFRICA	3	4	-3.36	2.14	47.4	67.4	3.93	3.35	27.3	40.9	4.81	3.94
Egypt	0	0	..	..	11.1	2.2	-2.41	-14.92	11.1	2.2	-2.41	-14.93
Ethiopia	0	0	..	..	1.3	1.9	48.12	3.93	0.0	0.0	..	..
Nigeria	0	0	..	..	4.4	12.0	11.98	9.47	4.4	12.0	332.36	9.47
South Africa	3	4	-3.36	2.13	11.0	15.4	5.90	3.00	3.7	5.6	9.65	3.90
ASIA	128	144	2.96	1.16	1 136.9	1 585.1	5.83	3.08	554.8	809.1	9.08	3.51
China[3]	75	75	-0.99	0.00	514.6	718.1	6.87	3.02	0.7	0.8	13.93	0.00
India	1	1	5.83	-2.08	16.0	22.9	15.12	3.15	0.1	0.0	..	..
Indonesia	0	0	..	..	130.8	186.6	6.52	3.25	130.8	186.6	6.52	3.25
Iran	8	9	3.29	0.92	1.9	0.6	-4.31	-11.21	7.6	7.0	-1.51	-1.02
Japan	0	0	..	..	56.7	54.3	0.69	0.00	0.0	0.0	..	..
Kazakhstan	0	0	..	..	7.5	20.6	19.78	9.47	7.5	20.6	203.86	9.47
Korea	0	0	..	..	34.3	34.7	-0.52	0.01	0.1	0.0	..	..
Malaysia	0	0	..	..	79.5	72.8	4.90	-1.18	79.5	72.8	4.90	-1.18
Pakistan	0	0	..	..	27.7	45.7	3.84	4.67	27.7	45.7	71.72	4.67
Philippines	0	0	..	..	63.6	132.4	13.89	6.92	63.6	132.4	-8.68	6.92
Saudi Arabia	0	0	..	..	6.5	17.8	12.73	9.47	6.5	17.8	387.84	9.47
Thailand	0	0	..	..	67.8	94.8	8.28	3.04	67.8	94.8	8.28	3.04
Turkey	43	59	16.88	2.91	0.4	0.7	..	5.24	43.3	60.0	17.22	2.94
Viet Nam	0	0	..	..	35.2	27.0	-1.15	-2.55	35.2	27.0	372.55	-2.55
OCEANIA	147	157	3.08	0.48	45.4	48.2	15.65	0.06	46.9	45.0	-1.55	0.10
Australia	116	124	2.58	0.52	20.9	22.1	7.77	0.00	31.7	29.6	-3.80	-0.02
New Zealand	31	32	5.16	0.31	24.2	25.9	29.46	0.12	15.1	15.4	5.30	0.33
DEVELOPED COUNTRIES	**2 835**	**3 212**	**1.34**	**1.15**	**386.8**	**397.3**	**7.49**	**0.38**	**1 216.6**	**1 408.2**	**3.96**	**1.43**
DEVELOPING COUNTRIES	**289**	**335**	**2.75**	**1.34**	**1 206.8**	**1 672.2**	**5.29**	**3.04**	**727.2**	**1 011.4**	**8.02**	**3.06**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	22.2	54.0	10.65	8.41	17.7	48.2	120.17	9.42
OECD[4]	**2 765**	**3 133**	**0.98**	**1.15**	**330.1**	**313.0**	**4.34**	**-0.21**	**1 144.7**	**1 323.7**	**3.85**	**1.41**
BRICS	**80**	**80**	**-1.03**	**0.10**	**673.8**	**909.6**	**7.29**	**2.73**	**7.8**	**10.0**	**13.70**	**1.88**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
4. Excludes Iceland but includes all EU member countries.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.36. Fresh dairy products projections: Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		FOOD CONSUMPTION (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**422 814**	**520 494**	**2.03**	**1.86**	**55.5**	**61.7**	**0.87**	**0.96**
NORTH AMERICA	25 796	24 346	-1.58	-0.41	70.5	62.4	-2.33	-0.98
Canada	2 872	2 851	-0.76	-0.03	77.0	69.9	-2.01	-0.82
United States	22 924	21 495	-1.68	-0.46	69.8	61.5	-2.37	-1.01
LATIN AMERICA	35 341	41 720	-0.23	1.69	54.6	59.0	-1.24	0.93
Argentina	1 539	1 674	-1.45	0.43	28.5	27.8	-1.80	-0.38
Brazil	14 896	19 310	0.41	2.48	71.4	86.9	-0.43	1.96
Chile	468	521	-9.46	-0.12	25.7	26.6	-10.22	-0.74
Colombia	5 877	6 829	1.20	2.01	118.8	129.1	0.28	1.42
Mexico	3 490	3 294	-1.42	-0.45	27.9	23.8	-2.61	-1.34
Paraguay	491	549	-0.10	0.95	71.2	70.6	-1.40	-0.11
Peru	1 809	2 429	1.97	2.84	55.6	66.6	0.68	1.81
EUROPE	76 372	76 401	-0.17	-0.05	101.3	103.0	-0.37	0.18
European Union[1]	37 401	37 745	0.84	-0.03	82.3	85.4	0.62	0.36
United Kingdom	7 783	7 706	0.67	-0.07	112.5	107.2	-0.28	-0.39
Russia	15 772	16 138	-1.84	0.10	110.6	114.4	-1.83	0.27
Ukraine	7 230	6 844	-1.80	-0.44	164.3	165.1	-1.31	0.11
AFRICA	34 146	44 377	-0.79	2.55	26.8	26.9	-3.29	0.21
Egypt	1 099	1 359	-3.79	2.10	11.1	11.5	-5.76	0.56
Ethiopia	3 065	4 444	-2.60	3.77	28.5	32.5	-5.03	1.56
Nigeria	220	248	1.02	1.20	1.1	1.0	-1.60	-1.28
South Africa	2 147	2 408	0.00	0.94	37.4	37.7	-1.32	-0.01
ASIA	247 711	329 928	4.17	2.51	54.8	67.4	3.17	1.80
China[2]	24 738	27 160	-0.47	0.10	17.8	19.3	-0.60	0.03
India	127 100	180 422	6.30	3.06	93.8	120.2	5.06	2.13
Indonesia	1 051	1 250	-0.51	1.76	3.9	4.3	-1.67	0.91
Iran	3 487	3 867	3.16	0.98	42.5	43.7	1.95	0.34
Japan	4 306	4 268	-0.18	-0.11	33.9	35.1	-0.03	0.34
Kazakhstan	4 845	5 051	0.51	0.26	263.3	250.4	-0.91	-0.53
Korea	1 347	1 269	-0.16	-0.44	26.5	25.0	-0.49	-0.43
Malaysia	46	48	-7.97	0.40	1.4	1.3	-9.44	-0.76
Pakistan	35 855	50 201	3.20	3.10	178.5	208.5	1.13	1.46
Philippines	20	23	2.47	1.38	0.2	0.2	0.86	0.02
Saudi Arabia	1 307	1 460	8.73	0.96	39.0	37.4	6.10	-0.36
Thailand	377	355	-10.97	-0.36	5.5	5.1	-11.28	-0.40
Turkey	14 744	17 536	4.50	2.02	180.1	199.4	2.89	1.52
Viet Nam	945	1 422	14.12	3.68	9.8	13.5	12.89	2.85
OCEANIA	3 447	3 722	2.26	0.56	69.3	63.4	-0.96	-0.76
Australia	2 881	3 133	2.04	0.63	103.3	96.0	-0.41	-0.61
New Zealand	537	556	3.64	0.18	43.3	40.8	-5.18	-0.46
DEVELOPED COUNTRIES	**134 100**	**138 765**	**0.09**	**0.30**	**93.3**	**94.6**	**-0.40**	**0.18**
DEVELOPING COUNTRIES	**288 714**	**381 729**	**3.05**	**2.50**	**46.8**	**54.8**	**1.73**	**1.40**
LEAST DEVELOPED COUNTRIES (LDC)	21 905	28 275	-0.03	2.60	25.3	25.6	-2.34	0.36
OECD[3]	**106 558**	**109 129**	**0.45**	**0.30**	**75.9**	**75.5**	**-0.22**	**0.12**
BRICS	**184 653**	**245 437**	**3.71**	**2.41**	**58.1**	**72.7**	**2.94**	**1.88**

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.37. Milk projections: Production, inventories, yield

Calendar year

	PRODUCTION (kt)		Growth (%)[1]		INVENTORIES ('000 hd)		Growth (%)		YIELD (t/head)		Growth (%)	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**839 528**	**996 760**	**2.00**	**1.56**	**707 939**	**782 044**	**1.03**	**0.84**	**1.19**	**1.27**	**0.97**	**0.71**
NORTH AMERICA	108 697	119 074	1.57	0.88	10 345	10 395	0.30	0.10	10.51	11.45	1.26	0.79
Canada	10 389	11 629	2.71	0.96	970	962	0.02	-0.07	10.71	12.09	2.69	1.03
United States	98 309	107 445	1.45	0.88	9 375	9 433	0.33	0.11	10.49	11.39	1.12	0.76
LATIN AMERICA	81 271	95 596	1.02	1.55	41 557	44 126	-1.80	0.46	1.96	2.17	2.87	1.08
Argentina	10 323	11 756	-0.68	0.99	1 719	1 699	-0.11	-0.10	6.00	6.92	-0.57	1.10
Brazil	34 947	43 192	2.35	1.95	16 669	18 475	-4.35	0.94	2.10	2.34	7.01	1.00
Chile	2 130	2 250	-2.56	0.17	1 195	1 022	-2.13	-1.57	1.78	2.20	-0.44	1.77
Colombia	6 970	8 090	1.00	1.97	6 697	7 338	2.04	0.51	1.04	1.10	-1.02	1.46
Mexico	12 252	13 139	1.43	0.74	2 526	2 646	0.83	0.44	4.85	4.97	0.60	0.30
Paraguay	506	606	0.03	1.64	225	251	0.47	0.60	2.26	2.42	-0.44	1.04
Peru	2 043	2 750	2.15	2.89	1 209	1 426	1.20	1.44	1.69	1.93	0.94	1.43
EUROPE	225 732	235 709	0.88	0.37	41 128	37 929	-0.77	-0.74	5.49	6.21	1.67	1.12
European Union[2]	151 661	158 214	1.31	0.35	20 875	19 430	-0.32	-0.63	7.22	8.09	1.65	0.99
United Kingdom	15 563	16 410	1.13	0.48	1 885	1 889	0.56	0.00	8.26	8.69	0.57	0.47
Russia	30 612	32 940	-0.27	0.59	7 922	7 492	-1.35	-0.51	3.86	4.40	1.10	1.10
Ukraine	10 338	9 712	-1.30	-0.43	2 800	2 242	-3.87	-2.01	3.69	4.33	2.68	1.61
AFRICA	44 079	56 406	-0.76	2.46	227 644	252 922	0.90	0.99	0.19	0.22	-1.65	1.45
Egypt	4 626	5 482	-3.00	2.00	6 841	6 962	0.53	0.43	0.68	0.79	-3.51	1.56
Ethiopia	3 438	4 925	-2.42	3.65	16 401	20 860	2.06	2.15	0.21	0.24	-4.39	1.47
Nigeria	521	639	0.04	2.22	2 291	2 533	1.00	0.77	0.23	0.25	-0.95	1.44
South Africa	3 308	3 929	0.90	1.48	946	957	-0.34	0.04	3.50	4.10	1.25	1.43
ASIA	348 807	458 793	3.67	2.43	380 656	430 302	1.72	0.98	0.92	1.07	1.92	1.43
China[3]	35 130	38 037	-0.19	0.53	12 833	12 952	-1.76	-0.41	2.42	2.62	1.94	1.00
India	184 019	254 528	5.37	2.82	140 441	161 556	2.13	1.22	1.31	1.58	3.17	1.58
Indonesia	1 538	1 972	0.40	2.44	14 223	16 519	2.93	1.22	0.11	0.12	-2.46	1.20
Iran	7 612	8 090	-0.64	0.61	20 883	18 655	-1.01	-1.39	0.36	0.43	0.37	2.02
Japan	7 300	7 297	-0.54	-0.01	846	813	-1.35	-0.31	8.63	8.97	0.82	0.30
Kazakhstan	5 530	5 949	0.95	0.63	2 766	2 546	0.30	-0.90	2.00	2.34	0.65	1.54
Korea	2 044	1 957	0.11	-0.35	258	241	0.67	-0.61	7.91	8.11	-0.56	0.26
Malaysia	46	48	-7.97	0.40	51	46	-15.65	-1.39	0.91	1.05	9.10	1.81
Pakistan	45 636	63 696	3.17	3.07	37 135	45 133	2.89	1.65	1.23	1.41	0.28	1.39
Philippines	20	23	2.47	1.38	5	5	-0.31	-0.71	3.70	4.57	2.79	2.11
Saudi Arabia	2 470	2 887	3.55	1.46	4 823	4 880	0.85	-0.11	0.51	0.59	2.68	1.57
Thailand	407	380	-10.45	-0.43	202	169	1.61	-1.98	2.01	2.25	-11.87	1.58
Turkey	21 537	27 627	4.89	2.37	29 369	33 884	5.78	1.06	0.73	0.82	-0.84	1.29
Viet Nam	945	1 422	14.12	3.68	338	430	11.54	2.08	2.79	3.31	2.31	1.57
OCEANIA	30 942	31 182	1.69	0.11	6 610	6 369	0.52	-0.19	4.68	4.90	1.16	0.30
Australia	9 326	8 606	-0.21	-0.53	1 543	1 400	-0.61	-0.53	6.05	6.15	0.41	0.01
New Zealand	21 549	22 499	2.61	0.36	5 012	4 916	0.90	-0.09	4.30	4.58	1.70	0.45
DEVELOPED COUNTRIES	**401 312**	**429 208**	**1.23**	**0.62**	**78 741**	**77 810**	**0.13**	**-0.13**	**5.10**	**5.52**	**1.10**	**0.75**
DEVELOPING COUNTRIES	**438 216**	**567 552**	**2.76**	**2.34**	**629 198**	**704 234**	**1.15**	**0.95**	**0.70**	**0.81**	**1.59**	**1.37**
LEAST DEVELOPED COUNTRIES (LDC)	27 329	35 266	0.02	2.61	219 943	246 897	0.93	1.07	0.12	0.14	-0.90	1.53
OECD[4]	**366 080**	**392 376**	**1.49**	**0.66**	**81 755**	**85 118**	**1.92**	**0.28**	**4.48**	**4.61**	**-0.43**	**0.38**
BRICS	**288 017**	**372 625**	**3.43**	**2.23**	**178 812**	**201 432**	**0.88**	**1.01**	**1.61**	**1.85**	**2.53**	**1.21**

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2017-19est: Data for 2019 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
4. Excludes Iceland but includes all EU member countries.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.38. Main policy assumptions for dairy markets

Calendar year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CANADA												
Milk target price[2]	CADc/litre	82.7	86.7	87.9	89.2	90.6	92.0	93.5	95.0	96.5	98.0	99.6
Butter support price	CAD/t	8 107.2	8 488.5	8 643.0	8 763.9	8 904.2	9 040.3	9 187.3	9 337.8	9 487.9	9 636.9	9 784.7
Cheese tariff-quota	kt pw	28.6	38.6	43.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6	52.6
In-quota tariff	%	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Out-of-quota tariff	%	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6
EUROPEAN UNION[3]												
Voluntary coupled support												
Milk and milk products[4]	mln EUR	852	846	846	846	846	846	846	846	846	846	846
Butter reference price[5]	EUR/t	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5
SMP reference price	EUR/t	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0
Butter tariff-quotas	kt pw	89.9	90.3	90.3	90.4	90.4	90.5	90.5	90.6	90.6	90.7	90.7
Cheese tariff-quotas	kt pw	118.9	119.5	119.9	120.2	120.5	120.8	121.2	121.5	121.8	122.1	122.5
JAPAN												
Direct payments[6]	JPY/kg	9.0	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Cheese tariff[7]	%	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2
Tariff-quotas												
Butter	kt pw	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
In-quota tariff	%	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Out-of-quota tariff	%	249.0	299.6	294.3	294.6	296.4	298.3	300.4	302.6	305.3	307.9	310.4
SMP	kt pw	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1
In-quota tariff	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Out-of-quota tariff	%	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0
WMP	kt pw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Out-of-quota tariff	%	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2
KOREA												
Tariff-quotas												
Butter	kt pw	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
In-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Out-of-quota tariff	%	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0
SMP	kt pw	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0
WMP	kt pw	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
In-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Out-of-quota tariff	%	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0
MEXICO												
Butter tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tariff-quotas												
Cheese	kt pw	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
In-quota tariff	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Out-of-quota tariff	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
SMP	kt pw	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Liconsa social program	mln MXN	1 241.3	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1	1 260.1
RUSSIA												
Butter tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Cheese tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
UNITED STATES[8]												
Butter tariff-quota	kt pw	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
In-quota tariff	%	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Out-of-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cheese tariff-quota	kt pw	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
In-quota tariff	%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Out-of-quota tariff	%	30.6	36.8	36.1	35.6	35.0	34.4	33.8	33.2	32.7	32.1	31.6
INDIA												
Butter tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Cheese tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Skim milk powder tariff	%	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Whole milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOUTH AFRICA												
Butter tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cheese tariff	%	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9
Skim milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Average 2017-19est: Data for 2019 are estimated.
1. Refers to all current European Union member States (excludes the United Kingdom)
2. For manufacturing milk.
3. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
4. Implemented in 19 Member States. The maximum quantity limit is 11.695 million dairy cow heads.
5. Buying-in when market prices go below the reference price for SMP and 90% of the reference price for butter is operable automatically for a maximum quantity of 109 000 tonnes for SMP and 50 000 tonnes for butter (before 2014, this ceiling was set at 30 000 tonnes). Above that ceiling intervention can take place only via tender. For 2018 due to a temporary measure the SMP buying in quantity at fixed prices of is set to 0. Buying in via a tendering procedure may still be possible.
6. In April 2017, in addition to skim milk powder, butter and cheese, milk used for fresh cream, concentrated skim mik and concentrated whole milk production became covered by the direct payments.
7. Excludes processed cheese.
8. A milk margin (all-milk price minus the average feed margin) protection program applies, which has been updated February 2018, and provides a dairy safety net to farmers. Farmers have to decide on enrolment and coverage levels.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.39.1. Fish and seafood projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**175 798**	**200 400**	**2.30**	**1.34**	**42 928**	**46 721**	**1.43**	**0.71**	**42 558**	**46 581**	**1.40**	**1.07**
NORTH AMERICA	6 349	6 680	0.09	0.59	6 201	6 441	1.70	0.27	2 777	2 602	-0.49	-0.48
Canada	1 024	1 099	-0.51	0.64	655	676	0.34	0.15	817	809	-0.29	-0.12
United States	5 325	5 582	0.21	0.58	5 546	5 765	1.87	0.28	1 959	1 793	-0.53	-0.63
LATIN AMERICA	15 529	16 623	-0.21	0.89	2 475	2 937	1.58	1.53	4 611	5 304	2.64	1.19
Argentina	835	896	0.42	0.81	68	60	1.61	0.00	589	627	-0.88	1.09
Brazil	1 312	1 470	0.98	1.05	649	786	-1.44	2.07	55	64	3.16	0.70
Chile	3 304	3 846	-1.44	1.49	150	168	7.37	1.27	1 493	2 240	3.84	3.30
Colombia	204	255	2.93	1.36	226	317	3.03	2.46	42	53	-7.09	-1.31
Mexico	1 909	2 036	1.62	0.64	507	631	6.73	1.92	340	310	5.27	-0.90
Paraguay	25	27	1.82	0.96	5	4	4.05	0.00	0	0	..	..
Peru	5 329	5 254	-1.53	0.67	175	185	6.45	0.56	607	439	-0.48	-1.89
EUROPE	18 223	19 211	1.40	0.61	11 631	12 342	0.12	0.42	10 677	11 708	1.35	0.80
European Union[1]	5 889	6 005	0.74	0.44	8 252	8 657	1.04	0.43	2 740	2 886	1.59	0.40
United Kingdom	909	941	1.38	0.55	1 214	1 203	-0.92	0.16	897	855	0.18	-0.09
Norway	3 757	3 946	0.76	0.48	251	189	1.22	-1.29	2 916	3 035	0.06	0.41
Russia	5 213	5 904	2.66	1.22	809	1 225	-6.40	2.14	2 431	3 248	3.55	2.32
Ukraine	102	113	-10.35	0.00	479	469	-1.78	-1.72	22	22	-19.17	-1.95
AFRICA	12 258	13 641	3.81	1.33	4 668	6 512	1.13	2.68	2 954	2 775	5.23	-0.47
Egypt	1 925	2 541	5.17	2.87	621	1 278	5.43	6.63	49	68	21.05	3.47
Ethiopia	57	68	13.29	1.69	3	5	11.68	2.28	1	0	-15.69	..
Nigeria	1 175	1 263	4.11	0.89	555	703	-13.49	1.35	6	6	-21.77	0.00
South Africa	562	584	-0.38	0.61	320	449	9.42	2.84	169	198	0.11	0.76
ASIA	121 813	142 511	2.79	1.55	17 263	17 731	2.38	0.29	20 601	23 299	0.98	1.63
China[2]	62 240	72 392	2.66	1.67	4 525	4 780	4.34	-0.43	8 149	8 554	0.77	1.63
India	12 391	15 371	5.46	1.44	59	106	12.59	3.31	1 348	1 340	4.78	0.49
Indonesia	12 342	14 697	5.54	1.97	185	208	-5.03	2.85	1 226	1 547	-0.32	2.54
Iran	1 254	1 527	7.77	1.65	48	10	-10.71	0.00	137	113	12.80	1.25
Japan	3 786	3 542	-2.46	-0.80	3 560	3 232	-0.83	-0.37	671	740	0.35	0.93
Kazakhstan	37	39	-0.78	0.11	77	86	-0.71	1.70	34	29	-1.73	0.15
Korea	1 903	1 847	-1.88	-0.35	1 820	1 946	2.58	0.67	580	672	-2.70	0.48
Malaysia	1 680	1 827	-0.52	0.88	600	579	1.88	-0.61	325	314	0.40	-1.05
Pakistan	668	691	1.41	0.70	10	9	18.29	0.00	237	253	5.09	0.28
Philippines	2 856	3 207	-1.05	0.55	541	548	12.57	-0.07	406	418	1.60	0.30
Saudi Arabia	140	186	7.50	1.76	305	349	1.35	1.75	63	68	7.26	3.47
Thailand	2 479	2 744	-2.85	1.18	1 997	2 074	2.36	0.40	1 741	2 107	-4.85	1.93
Turkey	632	683	-0.61	0.75	115	142	3.82	3.67	247	349	13.47	2.83
Viet Nam	7 452	9 389	5.08	2.09	514	503	13.95	0.58	3 078	4 195	5.17	2.90
OCEANIA	1 626	1 734	2.09	0.69	690	759	0.66	1.02	939	894	1.39	-0.29
Australia	280	354	1.49	2.13	485	528	0.31	1.13	62	48	1.60	-1.78
New Zealand	529	557	-0.50	0.49	54	55	-1.23	0.00	425	432	-0.67	0.40
DEVELOPED COUNTRIES	**30 101**	**31 410**	**0.58**	**0.46**	**22 599**	**23 392**	**0.48**	**0.35**	**14 839**	**15 778**	**0.86**	**0.56**
DEVELOPING COUNTRIES	**145 697**	**168 990**	**2.69**	**1.52**	**20 345**	**23 329**	**2.55**	**1.09**	**27 725**	**30 803**	**1.70**	**1.33**
LEAST DEVELOPED COUNTRIES (LDC)	13 670	16 018	3.77	1.78	1 435	1 739	9.71	1.41	1 889	1 888	7.40	-0.35
OECD[3]	**29 473**	**30 714**	**-0.26**	**0.45**	**23 164**	**23 883**	**1.06**	**0.38**	**13 189**	**14 224**	**0.70**	**0.64**
BRICS	**81 716**	**95 721**	**2.99**	**1.59**	**6 362**	**7 346**	**2.02**	**0.43**	**12 151**	**13 404**	**1.68**	**1.65**

.. Not available

Note: Fish: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Imports and exports refer to trade of food fish i.e. for human consumption. All data are in live weight equivalent. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.39.2. Fish and seafood projections: Reduction, food consumption

Calendar year

	REDUCTION (kt)		Growth (%)[4]		FOOD CONS. (kt)		Growth (%)[4]		FOOD CONS. (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**16 902**	**16 686**	**0.39**	**0.44**	**155 109**	**180 416**	**2.50**	**1.41**	**20.4**	**21.4**	**1.32**	**0.47**
NORTH AMERICA	1 095	1 161	1.84	0.06	8 159	8 841	1.21	0.80	22.4	22.8	0.47	0.22
Canada	24	38	-7.40	0.33	824	910	0.57	1.01	22.2	22.4	-0.44	0.22
United States	1 070	1 123	2.16	0.05	7 335	7 931	1.28	0.77	22.4	22.8	0.58	0.22
LATIN AMERICA	6 025	5 849	-3.47	0.51	6 834	7 987	2.40	1.41	10.6	11.4	1.33	0.63
Argentina	0	0	0.00	0.00	315	330	3.34	0.17	7.1	6.8	2.30	-0.66
Brazil	59	63	-2.89	-0.01	1 847	2 129	0.27	1.46	8.8	9.5	-0.57	0.92
Chile	1 431	1 364	-5.91	0.07	233	250	-0.60	0.43	12.8	12.8	-1.44	-0.19
Colombia	0	0	0.00	0.00	388	519	4.82	2.35	7.8	9.8	3.87	1.76
Mexico	196	278	-11.09	2.57	1 882	2 079	4.55	1.03	14.9	14.9	3.26	0.13
Paraguay	0	0	0.00	0.00	29	31	2.15	0.83	4.2	4.0	0.82	-0.23
Peru	4 086	3 915	-2.02	0.57	834	1 085	3.25	2.28	25.6	29.7	1.94	1.25
EUROPE	2 633	2 391	3.98	-0.19	16 120	17 057	0.31	0.48	21.6	22.9	0.15	0.56
European Union[1]	686	515	-0.58	-1.12	10 506	11 061	1.02	0.53	23.6	25.0	0.88	0.61
United Kingdom	0	0	0.00	0.00	1 220	1 289	-0.27	0.62	18.2	18.3	-0.94	0.24
Norway	743	697	7.17	0.07	292	337	1.44	1.05	54.7	57.8	0.35	0.23
Russia	478	479	5.28	0.22	3 046	3 332	-1.13	0.71	20.9	23.2	-1.32	0.89
Ukraine	0	0	-32.77	0.00	559	561	-2.53	-1.39	12.7	13.5	-2.04	-0.84
AFRICA	918	1 016	4.24	1.31	13 009	16 311	2.64	2.21	10.2	9.9	0.06	-0.13
Egypt	0	0	0.00	0.00	2 497	3 752	5.03	4.01	25.1	31.8	2.88	2.44
Ethiopia	0	0	0.00	0.00	59	73	14.57	1.73	0.5	0.5	11.70	-0.44
Nigeria	0	0	0.00	0.00	1 724	1 960	-4.32	1.06	8.8	7.6	-6.81	-1.42
South Africa	308	381	2.63	2.44	405	453	3.26	1.09	7.1	7.1	1.89	0.14
ASIA	6 102	6 139	2.93	0.59	109 896	128 886	2.95	1.48	24.3	26.2	1.92	0.77
China[2]	1 982	1 975	-1.38	0.79	55 701	65 843	3.12	1.60	39.0	45.0	2.59	1.41
India	766	765	14.62	0.00	9 997	13 022	5.47	1.69	7.4	8.7	4.24	0.77
Indonesia	62	70	18.61	0.00	11 212	13 274	6.02	1.94	42.0	45.2	4.78	1.08
Iran	162	162	12.02	1.18	1 003	1 262	5.62	1.74	12.2	14.3	4.39	1.10
Japan	700	497	-0.80	-1.07	5 774	5 336	-1.96	-0.77	45.4	43.9	-1.82	-0.32
Kazakhstan	0	0	0.00	0.00	76	96	-0.91	1.52	4.1	4.7	-2.31	0.72
Korea	118	130	-1.90	0.00	2 878	2 917	0.44	0.19	56.2	57.0	0.05	0.20
Malaysia	155	110	6.35	-1.68	1 794	1 987	0.75	0.91	56.0	54.5	-0.85	-0.25
Pakistan	120	107	2.70	-0.21	322	340	-1.05	1.33	1.6	1.4	-3.03	-0.28
Philippines	0	0	0.00	0.00	2 991	3 337	0.14	0.48	28.1	26.9	-1.44	-0.87
Saudi Arabia	0	0	0.00	0.00	383	467	2.42	1.52	11.4	12.0	-0.06	0.20
Thailand	390	280	-3.12	-2.25	2 111	2 371	2.70	1.24	30.5	34.0	2.35	1.20
Turkey	131	131	-2.08	1.10	367	341	-3.85	-0.19	4.5	3.9	-5.33	-0.68
Viet Nam	1 126	1 443	15.72	2.14	3 616	4 153	2.73	1.46	37.5	39.3	1.63	0.65
OCEANIA	129	129	0.89	0.41	1 091	1 334	1.75	1.91	26.9	28.9	0.23	0.74
Australia	55	52	1.72	1.31	648	783	0.57	1.78	26.0	28.0	-0.85	0.76
New Zealand	42	53	-3.55	-0.21	115	127	0.40	0.88	24.1	24.7	-0.61	0.17
DEVELOPED COUNTRIES	**4 928**	**4 635**	**2.64**	**-0.01**	**31 724**	**33 264**	**0.17**	**0.43**	**22.3**	**22.8**	**-0.26**	**0.22**
DEVELOPING COUNTRIES	**11 974**	**12 051**	**-0.41**	**0.63**	**123 385**	**147 152**	**3.17**	**1.64**	**20.0**	**21.1**	**1.81**	**0.54**
LEAST DEVELOPED COUNTRIES (LDC)	644	683	11.32	0.94	12 417	15 036	3.43	2.10	14.4	13.6	1.03	-0.13
OECD[3]	**5 198**	**4 878**	**-1.77**	**-0.03**	**32 811**	**34 273**	**0.52**	**0.45**	**23.7**	**23.9**	**-0.04**	**0.16**
BRICS	**3 593**	**3 664**	**1.85**	**0.69**	**70 997**	**84 779**	**3.13**	**1.57**	**22.2**	**25.0**	**2.29**	**1.04**

Note: Fish: The term “fish” indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Imports and exports refer to trade of food fish i.e. for human consumption. All data are in live weight equivalent. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.40.1. Ethanol projections: Production and use

Calendar year

	PRODUCTION (mln L)		Growth (%)[4]	DOMESTIC USE (mln L)		Growth (%)[4]	FUEL USE (mln L)		Growth (%)[4]
	Average 2017-19est	2029	2020-29	Average 2017-19est	2029	2020-29	Average 2017-19est	2029	2020-29
WORLD	**124 883**	**140 077**	**0.75**	**124 747**	**140 245**	**0.78**	**..**	**..**	**..**
NORTH AMERICA	61 999	65 521	0.44	58 595	62 945	0.58	..	..	..
Canada	1 808	2 040	0.49	3 165	3 136	-0.18	3 161	3 124	-0.18
United States	60 191	63 481	0.44	55 430	59 809	0.62	54 581	59 066	0.63
LATIN AMERICA	37 163	44 767	1.29	37 041	44 434	1.27	..	..	..
Argentina	1 093	1 462	3.21	1 076	1 451	3.19	1 062	1 418	3.19
Brazil	32 714	39 025	1.26	31 935	38 489	1.25	29 276	35 367	1.28
Chile	4	7	5.56	28	20	1.60	0	0	0.00
Colombia	506	686	1.11	764	1 004	0.51	643	895	0.56
Mexico	219	223	-0.50	371	383	0.22	172	186	0.61
Paraguay	468	800	1.60	403	540	1.42	348	443	1.74
Peru	207	275	2.47	255	291	2.32	194	255	2.38
EUROPE	8 144	7 970	-0.69	8 632	8 887	-0.29	..	..	..
European Union[1]	6 134	6 164	-0.51	6 435	6 580	-0.05	4 630	4 730	-0.07
United Kingdom	830	561	-4.67	1 029	1 054	-2.53	755	775	-3.32
Russia	644	614	-0.16	518	505	-0.31	0	0	0.00
Ukraine	375	472	1.85	367	462	1.89	185	241	2.13
AFRICA	997	1 241	2.03	980	1 140	2.23	..	..	..
Egypt	10	13	3.06	9	14	3.00	0	0	0.00
Ethiopia	109	167	3.75	109	167	3.75	38	70	4.40
Nigeria	40	66	3.00	163	138	1.32	0	0	0.00
South Africa	317	331	0.34	116	134	0.87	5	5	0.60
ASIA	16 273	20 308	1.10	19 211	22 574	0.80	..	..	..
China[2]	10 067	12 074	0.68	10 576	12 105	0.68	3 725	5 048	1.48
India	2 633	4 242	2.40	3 063	4 568	1.71	1 388	2 853	2.82
Indonesia	192	230	1.96	134	176	2.64	1	1	2.78
Iran	0	0	..	0	0	..	0	0	0.00
Japan	20	0	..	1 527	1 271	-1.53	895	678	-2.69
Kazakhstan	0	0	..	0	0	..	0	0	0.00
Korea	150	148	-0.39	564	593	-0.02	5	4	-3.27
Malaysia	0	0	..	0	0	..	0	0	0.00
Pakistan	600	432	0.41	19	20	0.09	0	0	0.00
Philippines	320	525	4.08	760	971	2.00	590	739	1.64
Saudi Arabia	0	6	28.10	73	49	1.23	0	0	0.00
Thailand	1 789	1 980	0.48	1 795	1 983	0.51	1 534	1 741	0.57
Turkey	114	139	1.47	214	236	0.84	97	93	-0.37
Viet Nam	220	289	0.49	215	285	1.08	109	175	1.75
OCEANIA	307	270	-0.04	289	264	-0.46	..	..	..
Australia	298	262	-0.08	283	258	-0.51	216	203	-0.64
New Zealand	3	1	0.00	0	0	..	0	0	0.00
DEVELOPED COUNTRIES	**70 786**	**74 096**	**0.31**	**69 187**	**73 521**	**0.43**	**..**	**..**	**..**
DEVELOPING COUNTRIES	**54 096**	**65 981**	**1.25**	**55 560**	**66 724**	**1.19**	**..**	**..**	**..**
LEAST DEVELOPED COUNTRIES (LDC)	362	482	2.99	366	483	2.99	..	..	..
OECD[3]	**70 320**	**73 745**	**0.31**	**70 025**	**74 544**	**0.42**	**..**	**..**	**..**
BRICS	**46 375**	**56 285**	**1.19**	**46 209**	**55 801**	**1.15**	**..**	**..**	**..**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.40.2. Ethanol projections: Share in volume terms and trade

Calendar year

	SHARE IN GASOLINE TYPE FUEL USE (%)		IMPORTS (mln L)		Growth (%)[4]	EXPORTS (mln L)		Growth (%)[4]
	Average 2017-19est	2029	Average 2017-19est	2029	2020-29	Average 2017-19est	2029	2020-29
WORLD	**..**	**..**	**11 148**	**9 687**	**-1.01**	**10 716**	**9 687**	**-1.01**
NORTH AMERICA	..	..	2 596	2 337	-1.74	5 940	4 934	-2.12
Canada	6.1	6.7	1 420	1 186	-1.21	89	90	0.00
United States	9.7	11.2	1 177	1 151	-2.27	5 851	4 844	-2.16
LATIN AMERICA	..	..	3 069	2 631	-0.12	2 370	2 960	0.31
Argentina	11.1	12.5	16	8	4.94	12	20	5.13
Brazil	46.2	49.9	1 686	1 428	-0.22	1 665	1 959	0.19
Chile	..	..	24	14	0.00	1	0	..
Colombia	..	..	262	324	-0.67	3	6	0.08
Mexico	0.4	0.5	155	162	1.30	3	2	-0.01
Paraguay	..	..	1	0	..	67	260	1.99
Peru	..	..	192	206	0.00	143	191	0.00
EUROPE	..	..	1 614	1 643	-1.13	1 231	876	0.13
European Union[1]	5.3	7.3	787	772	-2.53	663	507	0.12
United Kingdom	4.5	6.0	657	703	0.40	399	210	-0.02
Russia	0.0	0.0	2	2	-1.62	114	111	0.57
Ukraine	..	..	0	0	..	8	10	0.00
AFRICA	..	..	213	118	0.00	231	219	0.00
Egypt	..	..	1	1	0.00	2	1	0.00
Ethiopia	..	..	0	0	..	0	0	..
Nigeria	..	..	123	72	0.00	0	0	..
South Africa	..	..	11	4	0.00	212	200	0.00
ASIA	..	..	3 640	2 933	-1.14	922	667	0.43
China[2]	2.2	2.3	388	113	0.83	95	83	0.37
India	..	..	538	411	-3.44	107	84	3.06
Indonesia	..	..	34	1	0.00	92	55	0.00
Iran	..	..	0	0	..	0	0	..
Japan	1.8	1.8	1 498	1 273	-1.52	1	2	0.00
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	419	445	0.10	0	0	..
Malaysia	..	..	0	0	..	0	0	..
Pakistan	..	..	0	0	..	581	412	0.42
Philippines	..	..	440	447	0.00	0	1	0.00
Saudi Arabia	..	..	73	44	0.00	0	0	..
Thailand	..	..	24	20	1.90	18	17	-1.48
Turkey	..	..	100	98	0.00	1	0	0.00
Viet Nam	..	..	18	6	8.42	23	10	-7.84
OCEANIA	..	..	15	26	-1.87	23	31	0.20
Australia	1.2	1.2	14	25	-1.93	19	30	0.21
New Zealand	0.0	0.0	1	1	0.00	4	1	0.00
DEVELOPED COUNTRIES	**..**	**..**	**5 766**	**5 299**	**-1.50**	**7 410**	**6 045**	**-1.75**
DEVELOPING COUNTRIES	**..**	**..**	**5 381**	**4 388**	**-0.39**	**3 306**	**3 642**	**0.33**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	5	1	0.00	1	1	0.00
OECD[3]	**..**	**..**	**6 687**	**6 321**	**-1.27**	**7 034**	**5 694**	**-1.86**
BRICS	**..**	**..**	**2 625**	**1 958**	**-0.91**	**2 193**	**2 437**	**0.29**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.41.1. Biodiesel projections: Production and use

Calendar year

	PRODUCTION (mln L)		Growth (%)[4]	DOMESTIC USE (mln L)		Growth (%)[4]
	Average 2017-19est	2029	2020-29	Average 2017-19est	2029	2020-29
WORLD	**43 138**	**45 631**	**-0.51**	**43 630**	**46 696**	**-0.50**
NORTH AMERICA	8 722	8 701	-2.57	10 033	9 764	-2.14
Canada	315	372	0.09	391	436	-0.19
United States	8 407	8 328	-2.67	9 642	9 328	-2.22
LATIN AMERICA	8 686	10 586	1.84	7 390	8 766	1.39
Argentina	2 840	3 465	2.56	1 295	1 389	1.13
Brazil	5 164	6 254	1.51	5 134	6 235	1.50
Chile	0	0	..	0	0	..
Colombia	614	733	0.80	614	733	0.80
Mexico	0	0	..	0	0	..
Paraguay	12	23	6.02	12	23	6.02
Peru	56	111	6.10	335	385	1.43
EUROPE	15 522	13 908	-1.22	17 359	15 648	-1.48
European Union[1]	14 732	12 952	-1.36	16 063	14 317	-1.48
United Kingdom	481	621	1.00	986	995	-2.12
Russia	0	0	..	0	0	..
Ukraine	0	0	..	0	0	..
AFRICA	0	0	..	0	0	..
Egypt	0	0	..	0	0	..
Ethiopia	0	0	..	0	0	..
Nigeria	0	0	..	0	0	..
South Africa	0	0	..	0	0	..
ASIA	10 168	12 377	0.14	8 807	12 458	1.10
China[2]	959	1 106	2.25	1 172	1 359	1.00
India	179	204	0.26	177	226	2.06
Indonesia	5 287	7 009	-0.02	4 241	6 971	1.27
Iran	0	0	..	0	0	..
Japan	17	19	0.35	12	15	1.82
Kazakhstan	0	0	..	0	0	..
Korea	700	651	-0.44	676	629	-0.42
Malaysia	1 242	1 217	-1.14	750	1 102	1.77
Pakistan	0	0	..	0	0	..
Philippines	211	298	3.08	211	298	3.08
Saudi Arabia	0	0	..	0	0	..
Thailand	1 573	1 871	0.29	1 568	1 859	0.32
Turkey	0	0	..	0	0	..
Viet Nam	0	0	..	0	0	..
OCEANIA	40	59	3.64	41	60	3.55
Australia	40	59	3.64	41	60	3.55
New Zealand	0	0	..	0	0	..
DEVELOPED COUNTRIES	**24 301**	**22 687**	**-1.74**	**27 445**	**25 487**	**-1.72**
DEVELOPING COUNTRIES	**18 837**	**22 944**	**0.89**	**16 185**	**21 209**	**1.22**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	0	0	..
OECD[3]	**25 615**	**24 071**	**-1.64**	**28 735**	**26 849**	**-1.63**
BRICS	**6 302**	**7 564**	**1.58**	**6 483**	**7 820**	**1.43**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.41.2. Biodiesel projections: Share in volume terms and trade

Calendar year

	SHARE IN DIESEL TYPE FUEL USE (%)		IMPORTS (mln L)		Growth (%)[4]	EXPORTS (mln L)		Growth (%)[4]
	Average 2017-19est	2029	Average 2017-19est	2029	2020-29	Average 2017-19est	2029	2020-29
WORLD	**..**	**..**	**6 838**	**5 412**	**-2.95**	**6 132**	**4 405**	**-3.51**
NORTH AMERICA	..	..	1 971	1 833	0.97	762	769	-0.55
Canada	1.3	1.5	420	301	-2.29	342	237	-2.44
United States	4.1	4.3	1 551	1 532	1.75	420	532	0.43
LATIN AMERICA	..	..	279	274	0.00	1 567	2 094	3.59
Argentina	14.7	15.0	0	0	..	1 556	2 076	3.59
Brazil	11.0	11.7	0	0	..	11	18	4.03
Chile	..	..	0	0	..	0	0	..
Colombia	..	..	0	0	..	0	0	..
Mexico	0.0	0.0	0	0	..	0	0	..
Paraguay	..	..	0	0	..	0	0	..
Peru	..	..	279	274	0.00	0	0	..
EUROPE	..	..	3 979	2 439	-5.85	1 834	759	-9.78
European Union[1]	7.6	9.2	3 436	1 990	-6.06	1 774	684	-10.45
United Kingdom	3.3	3.8	542	448	-4.85	60	74	1.50
Russia	0.0	0.0	0	0	..	0	0	..
Ukraine	..	..	0	0	..	0	0	..
AFRICA	..	..	0	0	..	0	0	..
Egypt	..	..	0	0	..	0	0	..
Ethiopia	..	..	0	0	..	0	0	..
Nigeria	..	..	0	0	..	0	0	..
South Africa	..	..	0	0	..	0	0	..
ASIA	..	..	608	865	-0.81	1 970	783	-9.37
China[2]	1.0	1.3	590	833	-1.07	377	580	0.00
India	..	..	15	29	12.49	17	8	-11.15
Indonesia	..	..	0	0	..	1 046	39	-28.57
Iran	..	..	0	0	..	0	0	..
Japan	0.0	0.1	1	1	-0.04	6	5	-3.19
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	0	0	..	24	22	-0.83
Malaysia	..	..	0	0	..	492	115	-12.76
Pakistan	..	..	0	0	..	0	0	..
Philippines	..	..	0	0	..	0	0	..
Saudi Arabia	..	..	0	0	..	0	0	..
Thailand	..	..	2	2	2.23	7	15	-2.79
Turkey	..	..	0	0	..	0	0	..
Viet Nam	..	..	0	0	..	0	0	..
OCEANIA	..	..	1	1	-0.23	0	0	..
Australia	0.4	0.6	1	1	-0.24	0	0	..
New Zealand	0.0	0.0	0	0	..	0	0	..
DEVELOPED COUNTRIES	**..**	**..**	**5 952**	**4 274**	**-3.48**	**2 602**	**1 533**	**-6.22**
DEVELOPING COUNTRIES	**..**	**..**	**886**	**1 138**	**-0.62**	**3 530**	**2 872**	**-1.71**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	0	0	..	0	0	..
OECD[3]	**..**	**..**	**5 952**	**4 274**	**-3.48**	**2 626**	**1 555**	**-6.16**
BRICS	**..**	**..**	**605**	**862**	**-0.82**	**405**	**606**	**-0.16**

.. Not available

Note: Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.42. Main policy assumptions for biofuel markets

		2019est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Biodiesel												
Export tax	%	15.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
BRAZIL												
Ethanol												
Import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incorporation mandate[3]	%	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Biodiesel												
Tax concessions[4]	BRL/hl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CANADA												
Ethanol												
Incorporation mandate[3]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Biodiesel												
Incorporation mandate[3]	%	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
COLOMBIA												
Ethanol												
Import tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Blending target[2,5]	%	9.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Biodiesel												
Blending target[2]	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
EUROPEAN UNION												
Biofuel												
Energy share in fuel consumption[6]	%	7.4	7.7	7.9	8.0	8.2	8.3	8.5	8.7	9.0	9.2	9.4
Ethanol												
Tax concessions[4]	EUR/hl	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Import tariff	EUR/hl	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
Biodiesel												
Tax concessions[4]	EUR/hl	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Import tariff	%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
INDIA												
Ethanol												
Import tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Share of biofuel mandates in total fuel consumption	%	5.0	5.7	6.4	7.3	8.3	9.4	10.7	12.1	13.7	15.5	17.6
Biodiesel												
Import tariff	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Share of biofuel mandates in total fuel consumption	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
INDONESIA												
Biodiesel												
Blending target[2]	%	..	..	..	..	..	..	..	..	..	..	..
MALAYSIA												
Biodiesel												
Blending target[2]	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
THAILAND												
Ethanol												
Blending target[2]	%	13.5	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.4	8.4	8.4
Biodiesel												
Blending target[2]	%	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
UNITED STATES												
Renewable Fuel Standard[7]												
Total	mln L	75 405	76 049	76 049	76 049	76 049	76 049	76 049	76 049	76 049	76 049	76 049
advanced mandate	mln L	18 624	19 268	19 268	19 268	19 268	19 268	19 268	19 268	19 268	19 268	19 268
cellulosic ethanol	mln L	1 582	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233
Ethanol												
Import surcharge	USD/hl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Import tariff (undenatured)	%	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Import tariff (denatured)	%	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Blender tax credit	USD/hl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biodiesel												
Import tariff	%	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Blender tax credit	USD/hl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

.. Not available

Note: 2019est: Data for 2019 are estimated.For many countries, shares for ethanol and biodiesel are not individually specified in the legislation.Figures are based on a combination of the EU mandate in the context of the Renewable Energy Directive and the National Renewable Energy Action Plans (NREAP) in the EU member states.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Expressed in volume share.
3. Share in respective fuel type, in volume.
4. Difference between tax rates applying to fossil and biogen fuels.
5. Applies to cities with more than 500 000 inhabitants.
6. According to the current Renewable energy Directive 2009/28/EC, the energy content of biofuel other than first-generation biofuels counts twice towards meeting the target. It is assumed that other sources than biofuel will help filling the 10% transport energy target.
7. The total, advanced and cellulosic mandates are not at the levels defined in EISA. Details can be found in the policy assumptions section of the biofuel chapter.

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.43.1. Cotton projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**26 242**	**29 829**	**-0.63**	**1.47**	**9 097**	**11 186**	**-0.18**	**2.12**	**9 238**	**11 326**	**-0.05**	**2.09**
NORTH AMERICA	4 310	4 602	2.24	1.41	1	0	-22.58	..	3 384	3 987	2.64	1.53
Canada	0	0	..	..	0	0	-16.76	..	0	0	..	..
United States	4 310	4 602	2.24	1.41	1	0	-43.00	..	3 384	3 987	2.64	1.53
LATIN AMERICA	3 156	3 835	3.81	2.30	310	297	-6.14	0.29	1 446	2 681	7.92	3.96
Argentina	250	287	0.44	1.27	1	1	-19.67	0.00	91	110	3.80	0.40
Brazil	2 482	3 096	4.36	2.67	8	3	-18.89	0.02	1 281	2 478	8.84	4.24
Chile	0	0	..	..	0	0	..	..	0	0	..	..
Colombia	13	17	-12.45	0.00	26	23	-5.28	0.00	0	0	-55.45	..
Mexico	373	396	7.30	0.62	149	148	-7.11	0.46	70	88	2.84	2.07
Paraguay	4	5	-16.86	1.47	2	1	67.88	-1.25	3	4	-13.32	1.27
Peru	22	22	-7.96	0.16	43	37	-5.52	-0.15	1	1	-8.80	0.05
EUROPE	282	295	-0.67	0.51	335	351	-4.13	0.10	433	450	-0.13	0.31
European Union[1]	281	294	-0.68	0.51	278	292	-2.86	0.06	432	449	-0.14	0.31
United Kingdom	0	0	..	..	0	0	..	..	0	0	..	..
Russia	0	0	..	..	40	40	-10.60	0.00	0	0	47.96	..
Ukraine	0	0	..	..	2	2	-6.72	1.49	0	0	..	..
AFRICA	1 828	2 513	4.45	2.59	174	205	1.82	0.01	1 588	2 289	5.85	2.63
Egypt	100	83	-5.98	0.51	129	169	11.47	0.15	74	81	0.61	-0.15
Ethiopia	58	77	11.60	1.89	0	0	-74.44	..	7	0	19.06	-29.49
Nigeria	51	51	-1.08	0.00	1	1	-13.33	0.00	25	25	-6.51	0.00
South Africa	42	49	17.69	1.02	15	10	-3.29	-0.29	21	36	12.62	0.29
ASIA	16 053	17 887	-2.06	1.03	8 276	10 332	0.37	2.30	1 719	1 230	-8.16	-1.84
China[2]	5 961	6 198	-2.96	0.60	1 685	1 905	-11.69	1.18	35	39	11.89	0.16
India	5 900	6 834	-0.84	1.30	352	387	15.59	0.32	944	815	-7.70	-0.32
Indonesia	3	5	-8.21	1.77	719	956	3.80	2.95	1	0	-61.22	..
Iran	52	57	-2.28	1.33	69	71	1.42	0.70	0	0	..	..
Japan	0	0	..	..	53	48	-4.56	-0.70	0	0	..	..
Kazakhstan	76	78	0.27	0.00	0	0	..	..	56	65	-1.59	0.00
Korea	0	0	..	..	176	174	-5.12	0.96	1	0	56.71	..
Malaysia	0	0	..	..	166	200	4.41	1.47	58	62	-3.37	-1.45
Pakistan	1 713	2 107	-3.14	1.49	698	638	14.77	-0.63	41	32	-19.49	0.28
Philippines	0	0	..	..	14	21	5.03	4.04	0	0	..	..
Saudi Arabia	0	0	..	..	0	0	..	..	0	0	..	..
Thailand	1	2	0.25	2.52	242	240	-4.44	-0.05	0	0	..	..
Turkey	908	1 108	1.72	1.51	759	972	1.01	2.70	85	52	9.71	-2.63
Viet Nam	0	0	-31.70	..	1 525	2 192	20.06	3.54	0	0	..	..
OCEANIA	613	697	-9.46	6.80	1	1	-1.26	0.00	668	690	-5.67	8.25
Australia	612	696	-9.47	6.81	0	0	..	..	667	689	-5.68	8.26
New Zealand	1	1	0.00	0.00	1	1	0.00	0.00	1	1	0.00	0.00
DEVELOPED COUNTRIES	**6 534**	**6 957**	**-0.23**	**1.60**	**408**	**413**	**-4.21**	**0.01**	**5 038**	**5 376**	**-0.58**	**1.57**
DEVELOPING COUNTRIES	**19 708**	**22 872**	**-0.76**	**1.43**	**8 689**	**10 773**	**0.07**	**2.21**	**4 200**	**5 951**	**0.76**	**2.57**
LEAST DEVELOPED COUNTRIES (LDC)	1 393	2 020	4.39	3.06	1 669	2 379	9.01	3.84	1 120	1 699	7.53	3.35
OECD[3]	**6 509**	**7 125**	**0.82**	**1.75**	**1 446**	**1 660**	**-2.12**	**1.64**	**4 650**	**5 277**	**1.01**	**2.05**
BRICS	**14 385**	**16 177**	**-1.02**	**1.27**	**2 101**	**2 345**	**-9.49**	**1.00**	**2 281**	**3 367**	**-0.65**	**2.83**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.43.2. Cotton projections: Consumption

Marketing year

	CONSUMPTION (kt)[4]		Growth (%)[5]	
	Average 2017-19est	2029	2010-19	2020-29
WORLD	**26 168**	**30 130**	**1.37**	**1.35**
NORTH AMERICA	**669**	**589**	**-2.39**	**-1.03**
Canada	0	0	-18.30	..
United States	668	589	-2.36	-1.03
LATIN AMERICA	**1 507**	**1 433**	**-2.21**	**-0.70**
Argentina	161	170	0.09	0.05
Brazil	715	612	-3.68	-1.82
Chile	0	0	..	..
Colombia	40	40	-8.52	0.00
Mexico	438	454	1.38	0.30
Paraguay	3	2	-12.76	-0.04
Peru	59	58	-7.43	-0.04
EUROPE	**189**	**197**	**-6.97**	**0.71**
European Union[1]	132	138	-5.25	0.91
United Kingdom	0	0	..	..
Russia	41	40	-11.93	-0.09
Ukraine	2	2	-8.90	1.49
AFRICA	**372**	**430**	**0.79**	**1.09**
Egypt	157	172	2.52	0.46
Ethiopia	49	77	4.50	3.03
Nigeria	28	28	5.06	0.00
South Africa	19	23	-0.66	1.61
ASIA	**23 423**	**27 475**	**1.88**	**1.53**
China[2]	8 317	8 550	-0.52	0.42
India	5 453	6 406	2.64	1.47
Indonesia	729	961	3.60	2.94
Iran	116	128	-1.02	0.97
Japan	53	48	-4.34	-0.43
Kazakhstan	13	13	0.15	0.00
Korea	178	175	-4.60	0.97
Malaysia	108	138	20.75	3.13
Pakistan	2 389	2 713	0.98	0.97
Philippines	13	21	3.94	4.04
Saudi Arabia	0	0	..	..
Thailand	242	242	-4.71	-0.04
Turkey	1 544	2 029	2.23	2.21
Viet Nam	1 514	2 193	19.77	3.54
OCEANIA	**7**	**7**	**-4.00**	**-0.03**
Australia	6	6	-4.55	-0.03
New Zealand	1	1	0.00	0.00
DEVELOPED COUNTRIES	**1 708**	**1 968**	**0.33**	**1.10**
DEVELOPING COUNTRIES	**24 460**	**28 162**	**1.44**	**1.36**
LEAST DEVELOPED COUNTRIES (LDC)	**1 913**	**2 700**	**7.17**	**3.55**
OECD[3]	**3 063**	**3 482**	**-0.27**	**1.15**
BRICS	**14 545**	**15 630**	**0.30**	**0.73**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Consumption for cotton means mill consumption and not final consumer demand.
5. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.44. Main policy assumptions for cotton markets

Marketing year

		Average 2017-19est	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ARGENTINA												
Export tax equivalent of export barriers	%	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tariff equivalent of import barriers	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
BRAZIL												
Producer Minimum Price, lint cotton	BRL/t	5 097.1	5 748.4	5 864.5	5 864.5	5 864.5	5 946.2	6 104.0	6 265.2	6 466.7	6 679.6	6 900.0
Tariff equivalent of import barriers	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
EUROPEAN UNION												
Area for coupled payment	kha	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7
Coupled payment per ha[1]	EUR/ha	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KOREA												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEXICO												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RUSSIA												
Tariff equivalent of import barriers	%	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES												
Economic Adjustment Assistance payment level	USD/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRQ	kt	73.2	73.2	73.2	73.2	73.2	73.2	73.2	73.2	73.2	73.2	73.2
In-quota tariff	USD/t	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Out-of-quota tariff	USD/t	314.0	314.0	314.0	314.0	314.0	314.0	314.0	314.0	314.0	314.0	314.0
CHINA												
TRQ	kt	894.0	894.0	894.0	894.0	894.0	894.0	894.0	894.0	894.0	894.0	894.0
In-quota tariff	%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Out-of-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2017-19est: Data for 2019 are estimated.

1. If the area is higher than the ceiling, the amount is proportionally reduced.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.45. Roots and tubers projections: Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		FOOD CONSUMPTION (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**232 375**	**273 950**	**2.52**	**1.46**	**16.3**	**17.7**	**0.90**	**0.79**
NORTH AMERICA	5 498	5 687	1.18	0.20	12.5	12.2	0.39	-0.30
Canada	956	993	1.01	0.31	16.3	15.9	0.67	-0.48
United States	4 541	4 694	1.22	0.17	12.0	11.8	0.34	-0.29
LATIN AMERICA	14 015	15 545	-0.51	1.00	12.1	12.6	-0.66	0.44
Argentina	611	680	1.04	0.92	9.3	9.4	-0.58	0.05
Brazil	6 249	6 056	-3.83	-0.02	12.4	11.4	-3.95	-0.50
Chile	273	326	1.15	1.27	14.2	15.6	1.61	0.75
Colombia	1 348	1 778	3.29	2.22	22.0	25.9	2.32	1.35
Mexico	401	470	0.61	1.17	3.4	3.4	-0.22	0.07
Paraguay	989	1 136	4.65	1.09	41.0	36.8	-0.05	-1.02
Peru	1 647	2 036	3.23	1.89	32.5	36.8	2.04	1.04
EUROPE	26 469	24 636	1.20	-0.42	17.0	16.6	-0.25	-0.21
European Union[1]	11 444	9 314	0.08	-1.50	13.8	12.6	-1.34	-0.68
United Kingdom	1 238	1 262	0.19	0.18	17.0	16.6	-0.63	-0.15
Russia	7 004	6 598	3.88	-0.36	24.3	25.2	1.54	0.21
Ukraine	5 162	5 668	2.61	0.90	27.8	29.4	1.45	0.61
AFRICA	89 920	115 916	3.68	2.27	39.6	41.8	1.30	0.57
Egypt	1 136	1 429	2.73	2.30	8.1	9.3	0.73	1.31
Ethiopia	2 414	3 110	5.27	2.14	18.8	19.1	1.87	0.02
Nigeria	31 598	41 606	3.44	2.39	68.8	74.3	0.95	0.64
South Africa	489	602	1.25	1.93	5.9	6.3	-1.30	0.68
ASIA	95 380	110 873	2.48	1.24	10.4	10.8	0.32	0.33
China[2]	42 773	45 677	1.57	0.39	15.3	15.4	-0.06	0.04
India	13 375	16 890	3.18	1.98	7.1	8.0	1.16	1.03
Indonesia	9 334	11 190	2.09	1.25	18.7	19.4	1.22	0.30
Iran	966	1 095	0.72	1.01	10.1	10.7	0.16	0.31
Japan	746	727	-0.95	-0.08	6.3	6.3	-0.47	0.03
Kazakhstan	775	907	4.24	1.41	22.3	25.0	0.41	1.04
Korea	261	242	3.69	-0.80	5.1	5.3	4.33	0.05
Malaysia	38	46	7.90	1.71	3.5	4.0	2.28	1.00
Pakistan	1 026	1 327	3.82	2.43	3.9	4.6	1.51	1.65
Philippines	1 040	1 249	2.92	1.65	9.5	9.8	1.19	0.17
Saudi Arabia	79	97	-1.13	1.59	4.7	5.3	9.34	1.00
Thailand	10 639	13 714	5.36	2.45	5.3	5.2	-0.15	-0.37
Turkey	758	829	-2.58	0.86	6.9	6.1	-5.32	-0.98
Viet Nam	4 088	4 969	3.48	1.92	3.9	3.9	0.01	0.27
OCEANIA	1 093	1 292	1.30	1.52	22.5	23.1	-0.45	0.17
Australia	251	274	-0.37	0.83	10.3	9.3	-1.48	-0.88
New Zealand	135	149	2.90	1.38	11.9	12.5	-0.34	0.53
DEVELOPED COUNTRIES	**35 984**	**34 965**	**1.26**	**-0.10**	**14.0**	**13.7**	**-0.17**	**-0.20**
DEVELOPING COUNTRIES	**196 392**	**238 985**	**2.76**	**1.71**	**16.8**	**18.5**	**1.10**	**0.92**
LEAST DEVELOPED COUNTRIES (LDC)	44 644	57 393	4.05	2.32	32.2	34.4	2.03	0.78
OECD[3]	**22 629**	**21 349**	**0.43**	**-0.38**	**11.4**	**11.0**	**-0.60**	**-0.29**
BRICS	**69 889**	**75 824**	**1.45**	**0.63**	**11.9**	**12.1**	**-0.09**	**0.16**

Note: Calendar year. Average 2017-19est: Data for 2019 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.46. Pulses projections : Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		FOOD CONSUMPTION (kg/cap)		Growth (%)[4]	
	Average 2017-19est	2029	2010-19	2020-29	Average 2017-19est	2029	2010-19	2020-29
WORLD	**86 430**	**102 645**	**2.86**	**1.54**	**7.7**	**8.3**	**1.92**	**0.54**
NORTH AMERICA	10 282	12 012	4.40	1.37	5.8	6.3	3.75	0.46
Canada	7 548	8 838	4.78	1.38	14.9	15.6	4.51	0.20
United States	2 735	3 174	3.72	1.33	4.8	5.2	3.47	0.50
LATIN AMERICA	8 028	8 818	2.61	1.18	11.2	11.1	0.63	-0.26
Argentina	668	914	5.92	2.97	0.9	1.1	12.85	1.63
Brazil	3 123	3 511	-0.09	1.30	16.2	16.9	-0.18	0.43
Chile	74	84	-0.68	1.09	4.9	5.4	4.13	0.72
Colombia	214	277	1.67	2.02	6.7	6.3	-0.14	-0.77
Mexico	1 922	1 653	6.66	-0.71	10.2	6.8	1.93	-4.55
Paraguay	89	104	4.44	1.29	11.1	10.9	3.89	-0.29
Peru	303	360	2.18	2.22	9.4	10.4	2.25	0.96
EUROPE	7 702	10 288	3.48	2.56	3.1	3.5	5.68	0.82
European Union[1]	3 597	5 344	6.12	3.46	3.5	4.0	8.80	0.90
United Kingdom	526	589	-0.91	1.10	3.8	3.9	4.32	0.10
Russia	2 583	3 181	3.97	1.87	1.9	2.1	0.43	1.09
Ukraine	364	401	-4.74	0.50	1.5	1.3	-0.87	-0.71
AFRICA	19 102	21 292	2.76	0.98	11.4	11.4	0.69	0.05
Egypt	270	294	-0.86	0.76	5.4	5.1	-1.15	-0.71
Ethiopia	2 032	2 138	-0.30	0.35	14.9	12.6	-2.36	-1.55
Nigeria	3 495	4 268	3.58	1.87	12.4	13.0	2.60	0.44
South Africa	92	94	3.81	0.00	2.0	1.8	-4.80	-1.02
ASIA	38 691	47 285	2.58	1.75	7.2	7.8	2.08	0.62
China[2]	4 732	4 795	1.45	0.10	1.5	1.5	2.56	-0.28
India	21 234	26 999	2.94	2.15	15.4	16.4	1.94	0.43
Indonesia	193	555	-5.83	1.54	1.1	1.0	-2.16	-1.09
Iran	994	1 189	3.57	1.52	11.3	12.7	1.50	0.80
Japan	81	85	0.50	0.57	1.6	1.6	-1.08	0.45
Kazakhstan	67	85	-1.99	2.08	0.5	0.6	-5.42	0.99
Korea	22	31	6.64	2.00	1.4	1.4	0.18	0.01
Malaysia	0	0	..	..	3.4	3.8	1.25	0.99
Pakistan	1 242	1 422	6.48	1.44	7.0	6.9	2.04	-0.15
Philippines	75	94	2.22	2.62	1.3	1.2	-2.05	-0.89
Saudi Arabia	16	19	3.70	1.44	6.1	6.8	1.01	0.99
Thailand	240	334	1.73	3.66	3.8	4.1	4.85	0.46
Turkey	1 458	1 613	1.78	1.00	13.9	14.9	0.84	0.53
Viet Nam	327	365	0.89	0.98	3.1	3.1	0.14	0.02
OCEANIA	2 624	2 949	1.59	0.98	2.0	2.2	2.53	0.53
Australia	2 579	2 899	1.63	0.98	1.5	1.6	4.71	0.00
New Zealand	31	33	-1.35	0.52	4.0	4.5	-1.85	0.81
DEVELOPED COUNTRIES	**21 171**	**25 921**	**3.59**	**1.78**	**3.5**	**3.8**	**4.09**	**0.68**
DEVELOPING COUNTRIES	**65 259**	**76 724**	**2.63**	**1.47**	**8.7**	**9.2**	**1.62**	**0.43**
LEAST DEVELOPED COUNTRIES (LDC)	17 557	19 957	3.05	1.14	11.6	12.1	1.64	0.34
OECD[3]	**20 865**	**24 707**	**3.95**	**1.55**	**5.2**	**5.4**	**3.57**	**-0.13**
BRICS	**31 764**	**38 581**	**2.42**	**1.77**	**8.4**	**9.1**	**1.90**	**0.65**

.. Not available

Note: Calendar year. Average 2017-19est: Data for 2019 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.47. Information on food price changes

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2019	2020	2019	2020	2019	2020	2019	2020
OECD								
Australia[1]	1.3	..	3.7	..	12.8	12.8	0.5	..
Austria	1.8	2.0	1.2	1.2	12.0	12.0	0.1	0.1
Belgium	2.0	1.4	1.4	1.1	17.4	17.4	0.2	0.2
Canada	1.4	2.4	2.5	3.8	11.5	11.5	0.3	0.4
Chile	2.2	3.5	1.3	5.1	18.9	18.9	0.2	1.0
Czech Republic	2.5	3.6	-0.2	6.3	17.0	17.0	0.0	1.1
Denmark	1.3	0.7	1.1	0.0	11.5	11.5	0.1	0.0
Estonia	2.7	1.6	1.7	2.8	21.7	21.7	0.4	0.6
Finland	1.1	1.0	2.1	1.8	13.4	13.4	0.3	0.2
France	1.2	1.5	2.9	1.9	14.7	14.7	0.4	0.3
Germany	1.4	1.7	0.7	2.4	10.4	10.4	0.1	0.3
Greece	0.4	0.9	1.9	-0.1	17.1	17.1	0.3	0.0
Hungary	2.7	4.7	3.8	6.9	19.6	19.6	0.8	1.3
Iceland	3.4	1.7	4.8	1.3	14.9	14.9	0.7	0.2
Ireland	0.7	1.3	-1.5	-1.1	11.7	11.7	-0.2	-0.1
Israel	1.2	0.3	4.7	-0.9	14.3	14.3	0.7	-0.1
Italy	0.9	0.5	0.7	0.6	16.3	16.3	0.1	0.1
Japan	0.2	0.7	-2.2	0.7	19.0	19.0	-0.4	0.1
Korea	0.8	1.5	2.6	1.8	14.4	14.4	0.4	0.3
Luxembourg	1.8	1.9	2.6	1.5	11.1	11.1	0.3	0.2
Mexico	4.4	3.2	5.3	3.4	18.9	18.9	1.0	0.6
Netherlands	2.2	1.8	3.0	1.8	11.3	11.3	0.3	0.2
New Zealand[1]	1.5	..	0.7	..	17.4	17.4	0.1	..
Norway	3.1	1.8	1.2	2.1	13.3	13.3	0.2	0.3
Poland	0.7	..	0.8	..	24.1	24.1	0.2	..
Portugal	0.5	0.8	0.2	0.8	18.1	18.1	0.0	0.1
Slovak Republic	2.2	3.0	1.6	4.4	18.4	18.4	0.3	0.8
Slovenia	1.1	2.1	0.8	3.4	17.0	17.0	0.1	0.6
Spain	1.0	1.1	0.9	2.0	18.2	18.2	0.2	0.4
Sweden	1.9	1.3	1.6	2.4	13.9	13.9	0.2	0.3
Switzerland	0.6	0.2	0.8	-1.0	10.8	10.8	0.1	-0.1
Turkey	20.4	12.2	31.0	9.0	26.8	26.8	8.3	2.4
United Kingdom	1.8	1.8	0.9	1.4	11.8	11.8	0.1	0.2
United States	1.6	2.5	0.7	0.7	7.8	7.8	0.1	0.1
OECD Total	2.1	2.3	2.0	1.6	..	..	..	..
Enhanced Engagement								
Brazil	3.8	4.2	4.2	5.8	22.5	22.5	0.9	1.3
China	1.7	5.4	2.0	20.6	33.6	33.6	0.7	6.9
India	6.6	7.5	-2.2	23.6	35.4	35.4	-0.8	8.4
Indonesia	2.8	2.7	2.0	4.3	19.6	19.6	0.4	0.8
Russia	5.0	2.4	6.2	2.1	32.8	32.8	2.0	0.7
South Africa	3.9	4.4	2.9	1.2	18.3	18.3	0.5	0.2

Table C.47. Information on food price changes *(cont.)*

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2019	2020	2019	2020	2019	2020	2019	2020
Non OECD								
Algeria	2.6	1.4	1.4	-1.0	43.8	43.8	0.6	-0.4
Bangladesh	5.4	5.6	5.3	5.1	28.6	28.6	1.5	1.5
Bolivia	1.4	1.2	1.5	1.6	27.6	27.6	0.4	0.4
Botswana	3.5	2.2	-0.2	3.2	23.7	23.7	0.0	0.8
Bulgaria	3.0	4.2	3.6	8.0	37.2	37.2	1.3	3.0
Colombia	3.2	3.6	2.1	5.1	34.7	34.7	0.7	1.8
Costa Rica	1.7	1.6	-0.7	-0.3	21.4	21.4	-0.1	-0.1
Dominican Republic	0.7	2.1	-0.4	7.6	29.2	29.2	-0.1	2.2
Ecuador	0.5	-0.3	0.4	-0.7	23.0	23.0	0.1	-0.2
Egypt	12.5	7.2	12.5	2.6	26.3	26.3	3.3	0.7
El Salvador	0.3	2.1	0.8	3.7	26.0	26.0	0.2	0.9
Ethiopia	11.5	18.7	11.5	..	57.0	57.0	6.6	..
Ghana	9.0	7.8	8.0	7.8	37.0	37.0	3.0	2.9
Guatelama	4.1	1.8	9.8	1.3	28.6	28.6	2.8	0.4
Haiti	15.5	..	18.9	..	50.4	50.4	9.5	..
Honduras	4.0	3.5	1.1	1.2	31.8	31.8	0.4	0.4
Iraq	1.1	1.0	2.0	-2.8	35.0	35.0	0.7	-1.0
Jordan	3.6	-0.4	3.6	-1.9	35.2	35.2	1.3	-0.7
Kenya	4.7	5.8	1.6	9.6	36.0	36.0	0.6	3.5
Madagascar	6.2	3.9	6.3	3.0	60.0	60.0	3.8	1.8
Malawi	8.8	11.8	10.7	17.6	50.0	50.0	5.4	8.8
Malaysia	-0.7	1.6	1.0	0.9	56.3	56.3	0.6	0.5
Moldavia	2.2	4.6	-3.0	8.3	60.0	60.0	-1.8	5.0
Morocco	-0.5	1.3	-3.1	1.4	40.4	40.4	-1.3	0.6
New Caledonia	1.0	-0.1	-0.6	0.9	21.0	21.0	-0.1	0.2
Nicaragua	3.3	..	1.3	..	26.1	26.1	0.3	..
Niger	..	0.3	-4.0	-0.2	40.0	40.0	-1.6	-0.1
Nigeria	11.3	12.1	13.5	14.9	51.8	51.8	7.0	7.7
Pakistan	7.2	15.4	4.3	17.8	37.5	37.5	1.6	6.7
Panama	-0.3	0.4	0.9	-0.5	33.6	33.6	0.3	-0.2
Paraguay	2.4	2.8	-1.0	2.4	39.1	39.1	-0.4	0.9
Peru	2.4	2.9	1.5	2.8	25.0	25.0	0.4	0.7
Philippines	4.4	2.9	5.6	2.2	39.0	39.0	2.2	0.9
Romania	3.3	4.8	3.8	3.6	37.4	37.4	1.4	1.3
Rwanda	1.0	7.3	-4.3	15.8	39.0	39.0	-1.7	6.2
Senegal	0.6	2.0	0.7	2.0	53.4	53.4	0.4	1.1
Singapore	0.4	0.3	1.4	1.6	21.7	21.7	0.3	0.3
Sri Lanka	3.7	5.7	-2.1	12.4	41.0	41.0	-0.9	5.1
Chinese Taipei	0.2	1.8	0.8	2.6	23.7	23.7	0.2	0.6
Tanzania	3.0	3.7	0.7	5.7	38.5	38.5	0.3	2.2
Thailand	0.3	1.0	1.3	1.9	33.0	33.0	0.4	0.6
Tunisia	7.1	5.9	7.1	4.4	28.7	28.7	2.0	1.3
Uganda	2.7	3.4	-1.5	3.1	27.2	27.2	-0.4	0.8
Zambia	7.8	..	7.7	15.4	52.5	52.5	4.0	8.1

.. Not available
1. No data available for January 2020 in Australia and New Zealand.
2. CPI food: definition based on national sources.
3. Contribution is food inflation multiplied by expenditure share, expressed in %.

Source: OECD and national sources.

OECD-FAO Agricultural Outlook 2020-2029

The OECD-FAO Agricultural Outlook 2020-2029 is a collaborative effort of the Organisation for Economic Co-operation Development (OECD) and the Food and Agriculture Organization (FAO) of the United Nations, incorporating expertise from collaborating member countries and international commodity organisations. It provides market projections for national, regional and global supply and demand of major agricultural commodities, biofuel and fish.

During the preparation of the *OECD-FAO Agricultural Outlook 2020-2029*, the exact effects of the COVID-19 pandemic on agricultural markets were still largely unknown and they were therefore not incorporated in the baseline projections. Nevertheless, the Outlook aims to outline the channels of transmission of COVID-19 impacts on the various food and agriculture sectors.

Supplementary information can be found at www.agri-outlook.org.

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